FISHERY DATA SERIES NO. 86

CREEL AND ESCAPEMENT STATISTICS FOR COHO AND CHINOOK SALMON STOCKS OF THE LITTLE SUSITNA RIVER, ALASKA, DURING 1988[1]

By

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ABSTRACT

Creel surveys were conducted at three major access points to the Little Susitna River from 16 July through 6 September to estimate the effort for and catch and harvest of coho salmon *Oncorhynchus kisutch* by the sport fishery. Data from these surveys estimated that 12,759 coho salmon were harvested and an additional 1,381 coho salmon were caught and released during 73,665 angler-hours of effort. The majority of the estimated effort (65,470 hours) and coho salmon harvest (11,616) exited through the Burma Road survey site. Bait was the lure of choice by most anglers fishing for and harvesting coho salmon. Most of the harvested coho salmon were age 2.1. The contribution of hatchery-produced coho salmon to the sport harvest and escapement past the weir was estimated to be 51 and 22 percent, respectively, all of which originated from the 1987 smolt release at Nancy Lake. The estimated total return of coho salmon to the Little Susitna River during 1988 was 33,250. This is based on an estimated escapement of 20,491 coho salmon above the weir, an estimated sport harvest of 947 coho salmon above the weir, and an estimated sport harvest of 11,812 coho salmon below the weir. Coho salmon are not known to spawn downstream of the weir. Based on the estimated sport harvest of 12,759, this represents a minimum inriver exploitation rate by the sport fishery of 38 percent. It is not possible at this time to estimate total return or exploitation rate, as an unknown number of coho salmon are harvested in the mixed-stock commercial fisheries of upper Cook Inlet.

A creel survey was conducted at a major access point to the Little Susitna River (Burma Road) from 4 June through 6 July to estimate the effort for and catch (fish kept plus fish released) and harvest (fish kept only) of chinook salmon *Oncorhynchus tshawytscha* by the sport fishery. Data from this survey estimated that 1,960 chinook salmon were harvested and an additional 1,027 chinook salmon were caught and released during 42,955 angler-hours of effort. Most of the chinook salmon harvested were age 1.4. The estimated total return of chinook salmon to the Little Susitna River during 1988 was 9,492. This is based on an estimated escapement of 7,374 chinook salmon above a weir constructed at river kilometer 55.5, an estimated sport harvest of 338 chinook salmon above the weir, an estimated sport harvest of 1,622 chinook salmon below the weir, and an estimated 158 chinook salmon spawning below the weir. Based on the estimated sport harvest of 1,960 fish, this represents a minimum inriver exploitation rate by the sport fishery of 21 percent. It is also not possible at this time to estimate total return or exploitation rate of chinook salmon as an unknown number are harvested in the mixed-stock commercial fisheries of upper Cook Inlet.

KEY WORDS: chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, creel survey, effort, harvest, catch, hatchery contribution, escapement, age, sex, length.

INTRODUCTION

The Little Susitna River (Figure 1) supports the largest sport fisheries for chinook *Oncorhynchus tshawytscha* and coho *O. kisutch* salmon in the Matanuska-Susitna Valley (Mills 1979-1988). Angler-effort in these fisheries increased 220% from 1977 through 1987. Over this same period, harvests of chinook and coho salmon have increased 1,000% and 280%, respectively. In response to these large increases, the Little Susitna River has been annually stocked with coho salmon since 1982 (ADF&G 1981, Chlupach 1987).

The Alaska Department of Fish and Game (ADF&G), Division of Sport Fish, began an annual creel survey of the sport fishery for chinook salmon in the Little Susitna River in 1979 and for coho salmon in 1981. An annual life-history study of coho salmon in the Little Susitna River was begun in 1982. As part of this evaluation, a weir was constructed in 1986 to estimate the escapements of chinook and coho salmon. These surveys and life history evaluations are summarized in a series of annual progress reports (Watsjold 1980; Bentz 1983, 1986, 1987; Bartlett and Conrad 1988).

The objectives of this report are to present:

1. Estimates of angler-effort and harvest (number kept) and catch (number kept plus number released) of coho and chinook salmon in the Little Susitna River sport fishery during 1988;

2. Estimates of the spawning escapements of chinook and coho salmon to the Little Susitna River and other selected northern Cook Inlet index streams during 1988;

3. Estimates of the contribution of hatchery-reared coho salmon to the sport harvest and escapement during 1988; and

4. Estimates of the age, sex, and length compositions of the chinook and coho salmon in the sport harvest and escapement in the Little Susitna River during 1988.

METHODS

Creel Surveys

Approximately 113 km of the Little Susitna River were open by regulation during 1988 to salmon fishing (ADF&G 1988). Within this area, there are three major points of access to the fishery: (1) the boat launch at Ship Creek in Anchorage; (2) the Burma Road boat launch at river km 45.1; and (3) the boat launch at Miller's Landing in the city of Houston at river km 111.7 (Figure 1). During 1988, daily bag and possession limits were three coho salmon of 406 mm (16 inches) or greater total length and one chinook salmon of 406 mm (16 inches) or greater total length. The open season for coho salmon was not restricted. The open season for chinook salmon closed at 2400 hours on 6 July.

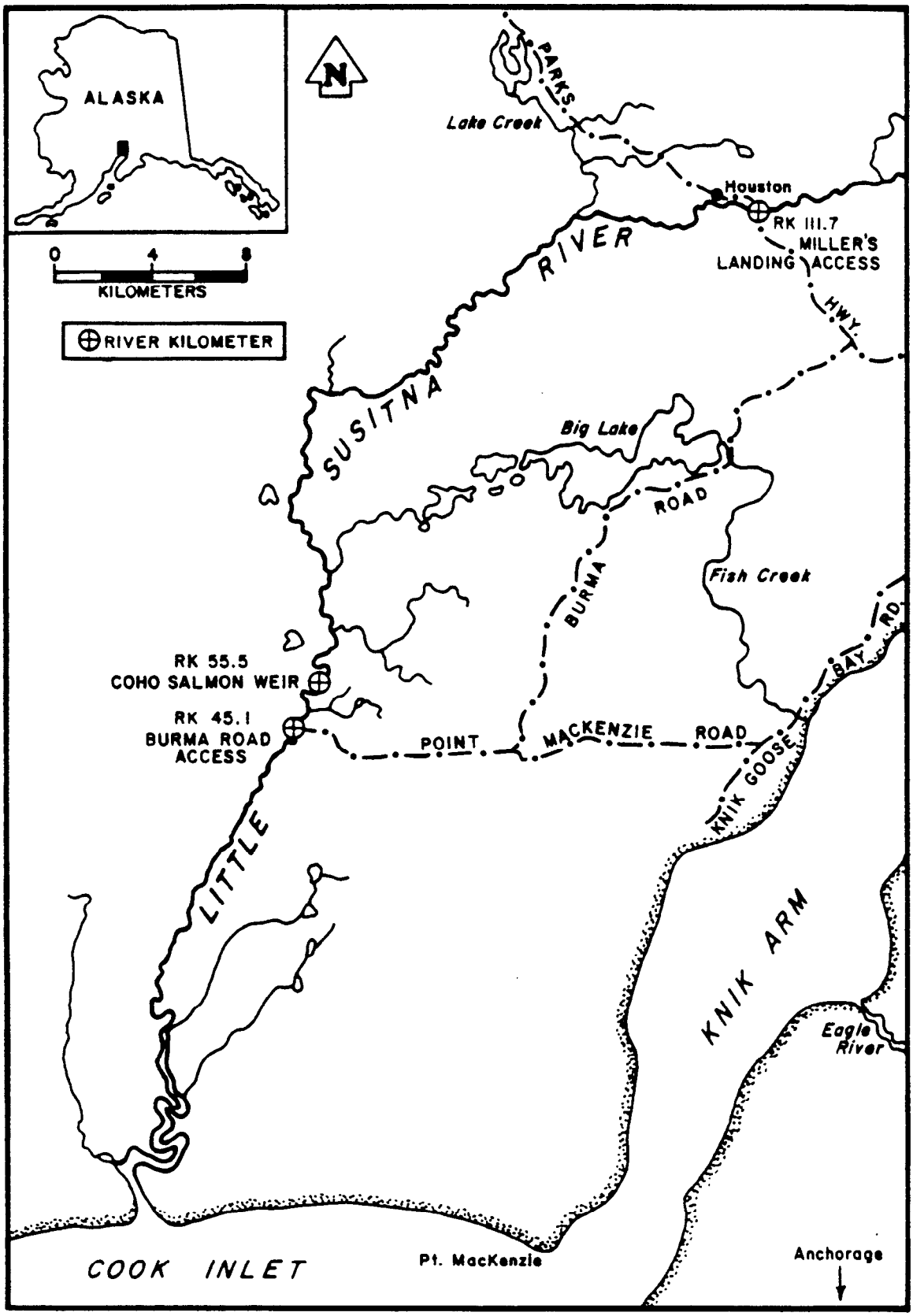

Figure 1. Map of the Little Susitna River.

Direct expansion and roving creel surveys were used to estimate angler-effort (in hours) and coho salmon harvest and catch rate at each of the major access points. A direct expansion creel survey was conducted only at the Burma Road access point to estimate angler-effort (in hours) and chinook salmon harvest and catch rate.

Direct Expansion Creel Surveys:

Direct expansion surveys census all anglers exiting an access site during a specific temporal period. The information is then expanded to include time not surveyed. Direct expansion surveys were implemented for the Burma Road, Miller's Landing, and Ship Creek access locations. The survey at Burma Road for coho salmon was augmented with a roving creel survey to include shore anglers fishing near the point of access.

The direct expansion survey for coho salmon at Burma Road was initially designed for a 16-hour fishing day (0800-2400 hours). The Burma Road survey was reduced to 13-hour days (0800-2100 hours) from 22 August through 5 September because of the decreased number of daylight hours. The survey at Ship Creek was designed for an 8-hour day; the hours censused each day were determined by the high tides as these are the only times this site is accessible by boat. The survey at Miller's Landing was designed for a 16-hour fishing day (0600-2200 hours).

A stratified, random sample design was used for the direct expansion creel surveys. Each fishing day at Burma Road was stratified into four 4-hour survey periods (A, B, C, and D). Fishing days at Miller's Landing were stratified into two 8-hour survey periods (A and B). From 22 August through 5 September at Burma Road each day was stratified into two 6.5-hour periods (A and B). The Ship Creek survey contained two 4-hour periods each day (A and B) which bracketed the high-slack tide by 2 hours.

The surveys were conducted from 16 July through 5 September at Burma Road, 30 July through 5 September at Miller's Landing, and 16 July through 21 August at Ship Creek. Each location was surveyed 5 days each week; the 2 days not surveyed were randomly selected without replacement from the weekdays. All Saturdays, Sundays, and holidays were surveyed. Each period (A, B, C, and D) was sampled on a day selected for survey. Effort and harvest and catch rate were estimated separately for the weekdays and weekend/holidays in each week.

On a day selected for sampling, a time to begin sampling in each period was randomly selected from those whole hours in the period (0500, 0600, etc.). This allowed the entire sample unit to fall within the defined period. Burma Road was surveyed for 3 hours during each 4-hour period; one-half hour was dedicated to the roving survey. Miller's Landing was surveyed for 3.5 hours during each period and Ship Creek for 4 hours during each period.

A creel survey clerk was stationed at an access site to the surveyed fishery during a selected sample period. All anglers departing the fishery through the access site during the sample period were interviewed by the survey clerk. If the survey clerk was unable to contact all anglers (usually due to

large numbers of anglers leaving the fishery at the same time), a tally of all anglers who were not interviewed was kept.

A direct expansion survey for chinook salmon at Burma Road was designed for a 20-hour fishing day (0400-2400 hours). Each fishing day was stratified into three periods (A, B, and C) of 8, 6, and 6 hours respectively. The survey was conducted from 4 June through 6 July. Days not surveyed were selected by the same method as days not surveyed in the coho salmon survey.

The following effort, catch, and harvest information were collected from each angler interviewed: completed-trip or incompleted-trip angler; number of hours spent fishing; number of fish harvested (kept) and number of fish released by species; shore or boat angler; guided or unguided angler; and fishing methods (lure, bait, or both). In addition, the following information on the locations fished by the angler was collected: angler fished upstream and/or downstream of the boat launch at Burma Road and angler fished upstream and/or downstream of the weir.

Definitions of the notation used to describe the direct expansion surveys are presented in Table 1. The estimation of angler effort by a direct expansion creel survey can be considered as a problem in estimating a rate. Effort is estimated in units of angler-hours. The rate estimated is the number of angler-hours leaving an access site during each hour the fishery was in progress. Only completed-trip angler interviews are used in the analyses. The product of this rate and the total number of possible fishing hours in the fishery is an estimate of angler effort. This can be expressed as:

$$\hat{E} = \sum_{j=1}^{p} H_j \, (\bar{e}_j/\bar{h}_j) \qquad [1]$$

The variance of effort is estimated as:

$$\hat{V}(E) = \sum_{j=1}^{p} H_j^2 \, V(\bar{e}_j/\bar{h}_j) \qquad [2]$$

The variance of the rate, $\bar{e}_j/\bar{h}_j$, can be approximated by the variance for the quotient of the mean of two random variables (Jessen 1978):

$$V(\bar{e}_j/\bar{h}_j) \approx (\bar{e}_j/\bar{h}_j)^2 (1/d_j)(s_e^2/\bar{e}_j^2 + s_h^2/\bar{h}_j^2 - 2rs_e s_h/\bar{e}_j\bar{h}_j)\,(1-h_j/H_j) \qquad [3]$$

The time spent surveying on day i of period j (h_{ij}) was usually relatively constant on each sampling occasion. In some instances, however, h_{ij} varied considerably due to logistical problems and the h_{ij} terms were considered random variables. This variation is represented by the variance of the sample unit length in Equation 3 (s_h^2). The coefficient of variation was used to determine if the h_{ij} were treated as random variables. If the coefficient of variation exceeded 20%, the h_{ij} were treated as random variables, otherwise the h_{ij} were treated as constant.

Table 1. Definitions for the notation used in the equations for the direct expansion creel surveys.

Notation	Definition
D	the number of days the fishery was open during a specific weekday or weekend/holiday component of a fishery[1].
d_j	the number of days censused during period j of a specific weekday or weekend/holiday component of a fishery[1].
$\hat{E}$	the estimate of effort in angler-hours[2] for a specific weekday or weekend/holiday component of a fishery[1].
$\bar{e}_j$	the mean number of angler-hours[2] leaving a census site during a sample unit in period j of a specific weekday or weekend/holiday component of a fishery[1].
e_{ij}	the number of angler-hours[2] leaving a census site during period j on day i of a specific weekday or weekend/holiday component of a fishery[1].
$\bar{f}_{ij}$	the mean number of hours fished by anglers censused during period j on day i of a specific weekday or weekend/holiday component of a fishery[1].
H_j	the number of hours of possible fishing time during period j of a specific weekday or weekend/holiday component of a fishery[1].
$\bar{h}_j$	the mean number of hours censused on days sampled during period j of a specific weekday or weekend/holiday component of a fishery[1].
h_j	the number of hours censused during period j of a specific weekday or weekend/holiday component of a fishery[1].
h_{ij}	the number of hours censused during period j on day i of a specific weekday or weekend/holiday component of a fishery[1].
M_{ij}	the number of completed-trip anglers leaving the fishery during period j of day i during a specific weekday or weekend/holiday component of a fishery[1].
m_{ij}	the number of completed-trip anglers leaving the fishery who are interviewed during period j of day i during a specific weekday or weekend/holiday component of a fishery[1].
p	the number of daily time periods (A, B, C, etc.) in a specific weekday or weekend/holiday component of a fishery[1].

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Table 1. Definitions for the notation used in the equations for the direct expansion creel surveys (continued).

Notation	Definition
r	the correlation between the e_{ij} and h_{ij} for sample units collected during a specific weekday or weekend/holiday component of a fishery[1].
s_e^2	the sample variance for the mean number of angler-hours leaving a census site on a sample day during a period of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{e}_j$).
s_{eij}^2	the estimated sample variance for the mean number of angler-hours leaving a census site during period j on day i of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{e}_{ij}$).
s_{fij}^2	the sample variance for the mean effort by anglers departing a fishery during period j on day i of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{f}_{ij}$).
s_h^2	the sample variance for the mean number of hours censused on a sample day during a period of a specific weekday or weekend/holiday component of a fishery[1] ($\bar{h}_j$).

[1] Fishery refers to an access site that is censused to estimate effort and catch for a particular fishery.

[2] All angler-hours referred to are for completed-trip anglers.

For h_{ij} terms which were constant, s_h^2 equals 0 and the variance of the estimate of angler effort simplifies to:

$$\hat{V}(E) = \sum_{j=1}^{P} d_j \, (H_j/h_j)^2 \, s_e^2 \, (1-h_j/H_j) \qquad [4]$$

When it was not possible to interview all anglers leaving an access site, the effort by the anglers who were not interviewed was estimated. In contrast to the previous situation where the effort leaving the fishery during period j on day i (e_{ij}) was considered to be measured without error, error is now associated with e_{ij}. Effort leaving the fishery during a given sample unit was estimated for period j on day i by:

$$\hat{e}_{ij} = M_{ij} \, \bar{f}_{ij} \qquad [5]$$

and

$$s(\hat{e}_{ij}) = M_{ij}^2 \, (s_{fij}^2/m_{ij}) \, (1-m_{ij}/M_{ij}) \qquad [6]$$

Effort for period j was estimated by:

$$\hat{E}_j = H_j \, (\hat{e}_j/h_j) \qquad [7]$$

The variance of $\hat{E}_j$ was estimated using equations 2 and 3 with the exception that the variance of the mean number of completed-trip angler-hours censused during each sampling event now has two components, the within-day variance due to missed anglers and the between-day variance. Letting s_e^2 estimate the variance of e_j:

$$\hat{s}_e^2 = s_{Be}^2 + h_j/[d_j(H_j - h_j)] \, [\sum_{i=1}^{D} \hat{(s_{eij}^2)}] \qquad [8]$$

with the between-day variance (s_{Be}^2) estimated as:

$$s_{Be}^2 = [\sum_{i=1}^{D} (\hat{e}_{ij} - \bar{e}_j)^2]/(d_j - 1) \qquad [9]$$

The variance of $\hat{E}_j$ was estimated by substituting $\hat{s}_e^2$ for s_e^2 in equation 3 (Sukhatme et al. 1984).

The harvest and catch of a species and their variances were estimated with the same procedures used to estimate effort by simply substituting the corresponding quantities for harvest or catch in place of effort.

Assumptions necessary for the direct expansion creel survey design are:

1. No significant fishing effort occurs during the hours not included in the fishing day.

2. All anglers participating in the fishery exit the fishery through a surveyed access site.

3. All anglers who are not interviewed are counted and all non-interviewed anglers are completed-trip anglers.

Roving Creel Survey:

The effort, harvest, and catch by shore anglers fishing for coho salmon near the Burma Road access site were estimated using a roving creel survey (Neuhold and Lu 1957). The roving creel survey at Burma Road was incorporated into the direct expansion survey schedule. Within the periods and survey times for the direct expansion survey, one-half hour was randomly selected for conducting the roving survey. One angler count was conducted during each survey period of the direct expansion survey. A count of all shore anglers within 1.6 km upstream and 1.6 km downstream of the Burma Road survey location was conducted from a riverboat. Angler counts were considered instantaneous (Neuhold and Lu 1957). The harvest and catch rates from the shore anglers exiting the fishery at Burma Road during the direct expansion survey were applied to these anglers.

Definitions of the notation for the roving creel survey are presented in Table 2. Angler effort (angler-hours) and its variance were estimated separately for the weekdays and weekend/holiday days each week. Effort was estimated as follows (Scheaffer et al. 1979):

$$\hat{E} = \sum_{j=1}^{p} \bar{x}_j H_j \qquad [10]$$

The variance of E_j was estimated by (Scheaffer et al. 1979):

$$\hat{V}(E) = \sum_{j=1}^{p} [H_j^2 (s_j^2/n_j)] \qquad [11]$$

Total effort was estimated by summing all the weekday and weekend/holiday estimates. Since these are considered independent estimates, the estimated variance of the total was the sum of the variances.

Rates of catch and harvest (number of fish per angler-hour) were estimated using a two-stage sampling design with a finite number of primary sample units (days) and an unknown number of secondary units (anglers). Only completed-trip interviews were used to estimate catch and harvest rates. Catch rates were estimated for each sampled day and for each weekday and

Table 2. Definitions for the notation used in the equations for the roving creel survey.

Notation	Definition
$\hat{C}$	the estimate of catch[1] during a specific weekday or weekend/holiday component of a fishery.
$\bar{c}$	the mean catch[1] per angler by all anglers interviewed during a specific weekday or weekend/holiday component of a fishery.
$\bar{c}_i$	the mean catch[1] per angler by all anglers interviewed on day *i* during a specific weekday or weekend/holiday component of a fishery.
c_{ik}	the catch[1] by angler *k* interviewed on day *i* during a specific weekday or weekend/holiday component of a fishery.
D	the number of days the fishery was open during a specific weekday or weekend/holiday component of a fishery.
d	the number of days on which angler interviews were conducted during a specific weekday or weekend/holiday component of a fishery.
$\hat{E}$	the estimate of effort in angler-hours for a specific weekday or weekend/holiday component of a fishery.
$\bar{f}$	the mean number of hours fished by all anglers interviewed during a specific weekday or weekend/holiday component of a fishery.
f_{ik}	the number of hours spent fishing by angler *k* interviewed on day *i* during a specific weekday or weekend/holiday component of a fishery.
H	the number of hours of possible fishing time during a specific weekly, weekday or weekend/holiday component of a fishery.
H_j	the number of hours of possible fishing time during period *j* of a specific weekday or weekend/holiday component of a fishery.
m_i	the number of anglers interviewed on day *i* during a specific weekday or weekend/holiday component of a fishery.
n	the number of angler counts conducted during a specific weekly, weekday or weekend/holiday component of a fishery.
n_j	the number of angler counts conducted during period *j* of a specific weekday or weekend/holiday component of a fishery.

-continued-

Table 2. Definitions for the notation used in the equations for the roving creel survey (continued).

Notation	Definition
p	the number of daily time periods (A, B, C, etc.) in a specific weekday or weekend/holiday component of a fishery.
r	the correlation between the c_{ik} and f_{ik} for anglers interviewed during a specific weekday or weekend/holiday component of a fishery.
s^2	the sample variance for the mean angler count during a specific weekly, weekday or weekend/holiday component of a fishery ($\bar{x}$).
s_c^2	the two-stage estimate of variance for the mean catch by anglers interviewed during a specific weekday or weekend/holiday component of a fishery ($\bar{c}$).
s_f^2	the two-stage estimate of variance for the mean effort by anglers interviewed during a specific weekday or weekend/holiday component of a fishery ($\bar{f}$).
s_i^2	the sample variance for the mean catch by anglers interviewed on day i of a specific weekday or weekend/holiday component of a fishery ($\bar{c}_i$).
s_j^2	the sample variance for the mean angler count during period j of a specific weekday or weekend/holiday component of a fishery ($\bar{x}_j$).
$\bar{x}$	the mean angler count for a specific weekly, weekday or weekend/holiday component of a fishery.
$\bar{x}_j$	the mean angler count for period j during a specific weekday or weekend/holiday component of a fishery.

[1] Catch refers to either the catch of a single species (fish kept plus those released) or to harvest of a single species (fish kept) depending on the quantity being estimated.

weekend/holiday component. Catch per unit of effort (CPUE) was estimated for each of the weekday and weekend/holiday components of the fishery as:

$$CPUE = \bar{c}/\bar{f} = \left[\sum_{i=1}^{D}\sum_{k=1}^{m_i} c_{ik}\right] / \left[\sum_{i=1}^{D}\sum_{k=1}^{m_i} f_{ik}\right] \qquad [12]$$

The variance of CPUE was approximated using the formula for the quotient of the mean of two random variables (Jessen 1978) as:

$$V(CPUE) \approx [\bar{c}/\bar{f}]^2 \; [s_c^2/\bar{c}^2 + s_f^2/\bar{f}^2 - (2rs_cs_f/\bar{cf})] \qquad [13]$$

The two-stage variance estimate for $\bar{c}$ was estimated as (Sukhatme et al. 1984, Von Geldern and Tomlinson 1973):

$$s_c^2 = [1-(d/D)]s_B^2/d + [\sum_{i=1}^{D} (s_i^2/mi)]/(dD) \qquad [14]$$

where:

$$s_B^2 = [\sum_{i=1}^{D} (\bar{c}_i-\bar{c})^2]/(d-1) \qquad [15]$$

The variance for $\bar{f}$ was estimated identically as for $\bar{c}$ by substituting the necessary quantities for effort into equations 14 and 15.

Total catch for any weekday or weekend/holiday component was estimated as:

$$\hat{C} = E(CPUE) \qquad [16]$$

The variance of this estimate was calculated using the formula for the product of two independent random variables (Goodman 1960):

$$\hat{V}(C) = [\hat{E}^2 \; V(CPUE)] + [CPUE^2 \; \hat{V}(E)] - [\hat{V}(E) \; V(CPUE)] \qquad [17]$$

Harvest rates, total harvest, and associated variances were estimated following the above procedures with the exception that HPUE and mean harvest per angler estimated from interviewed anglers were used.

The total harvest and catch were estimated by summing the estimates for all the weekday and weekend/holiday components. Since these are considered independent estimates, the estimated variance of the total was the sum of the variances.

Several necessary assumptions are:

1. Counts of anglers made during the same day and on consecutive days are independent.

2. Catch and harvest rates of shore anglers for coho salmon exiting the fishery at Burma Road are representative of those for shore anglers counted during the roving creel survey.

3. The number of anglers interviewed during any day is proportional to the effort on that day.

4. No significant fishing effort occurs during the hours not surveyed.

Gear Type

Effort, catch, and harvest at each site were calculated separately for anglers using bait, lures, or a combination of bait and lures. Estimates for the missed anglers at Burma Road were not included in these calculations, nor were estimates for shore anglers interviewed during the roving creel survey at Burma Road.

Escapement

A weir was constructed across the Little Susitna River at river km 55.5. Daily and cumulative totals of five salmon species were recorded from 1 June through 12 September as the salmon passed through the weir and over a white flash panel. The salmon were counted during daylight hours when visibility was sufficient to identify the fish to species.

Coho salmon spawning in index areas of selected Matanuska-Susitna Valley streams were counted using either foot, helicopter, or canoe surveys during peak spawning periods. Peak periods were identified through periodic inspections of spawning activity in streams which are easily monitored. Surveyors wore Polaroid glasses while conducting surveys. Live and dead fish were counted separately and recorded in field notebooks.

Age, Sex, and Length Compositions

Chinook and coho salmon were randomly sampled[1] for age, sex, and length information from the escapement passed at the weir and harvest exiting at Burma Road during the creel survey. Three scales were collected from each fish and mounted on adhesive-coated cards (Clutter and Whitesel 1956). Impressions of scales were thermohydraulically made in cellulose acetate and the impressions were examined using a microfiche reader. Age was recorded using the European method (Koo 1962) where the numeral preceding the decimal

[1] No coho salmon having an adipose finclip were sampled for age, sex, or length information.

is the number of freshwater annuli and the numeral following the decimal is the number of marine annuli. Total age from brood is the sum of the two numerals plus one. The mid-eye to fork-of-tail length of sampled fish was also recorded to the nearest one-half centimeter. Sex was recorded as male or female for each sampled fish based on visually discernible characteristics.

The proportional age composition of the sampled portions of the escapement and sport harvest were estimated. Letting p_h equal the estimated proportion of age group h in the sample, the variance of p_h was estimated using the normal approximation to the binomial (Scheaffer et al. 1979):

$$\hat{V}(p_h) = \hat{p}_h(1-\hat{p}_h)/(n_T-1) \qquad [18]$$

where n_T is the total number of legible scales collected from coho salmon.

Mean length-at-age by sex and its variance were estimated using standard normal procedures.

Hatchery Contributions

A portion of the coho salmon harvested by the sport fishery were examined for a missing adipose fin at the three survey locations: Burma Road, Miller's Landing, and Ship Creek. In addition, a portion of the coho salmon passed through the weir were examined for a missing adipose fin. Coho salmon having a missing adipose fin were assumed to contain a coded-wire tag (CWT) implanted at a hatchery.

Adult coho salmon were expected to return to the Little Susitna River in 1988 from a stocking of smolts during 1987 and a stocking of fingerling during 1985. The heads of fish having a missing adipose fin were bagged, labeled, frozen, and transferred to the Fisheries Rehabilitation, Enhancement, and Development (FRED) Division CWT lab for CWT removal and decoding.

The contributions to the harvest of coho salmon from hatchery stockings were calculated using the procedures of Clark and Bernard (1987). The numbers of unmarked fish and fish having a missing adipose fin collected at each creel survey location were compared with a chi-square statistic to determine if the proportions of marked coho salmon observed at the survey locations were equal. Based on these tests there were no significant differences ($\alpha = 0.05$) in the proportions of finclipped coho salmon observed at the survey locations. However, because of interest in the numbers of hatchery fish caught by location, separate estimates were derived for each survey location.

The estimated contribution of a release, $(\hat{C}_r)$, was as:

$$\hat{C}_r = (m_1/m_2)\ (a_1/a_2)\ (\hat{C}_T/n_2)\ (\hat{m}_c/R) \qquad [19]$$

where:

$\hat{C}_T$ = total estimated harvest of coho salmon by the fishery,
n_2 = number of coho salmon examined from the harvest,
a_1 = number of coho salmon with an adipose finclip that were observed in the harvest,
a_2 = number of heads from coho salmon with an adipose finclip collected from the harvest and sent to the tag lab,
m_1 = number of CWTs that are detected in the heads at the tag lab,
m_2 = number of CWTs decoded at the tag lab,
m_c = number of CWTs having a unique code, and
R = the proportion of the total number of coho salmon smolts released that were tagged with CWT' and received an adipose finclip[2].

The variance of $\hat{C}_r$ was calculated as the variance of a product divided by a constant.

$$\hat{V}(\hat{C}_r) = [\hat{C}_T^2\, \hat{V}(\hat{m}_c) + \hat{m}_c^2\, \hat{V}(\hat{C}_T) - \hat{V}(\hat{m}_c)\, \hat{V}(\hat{C}_T)]\, [(m_1 a_1)/(m_2 a_2 n_2 R)]^2 \quad [20]$$

and the variance of $\hat{m}_c$ (Clark and Bernard 1987) was calculated as follows:

$$V[m_c] = \left[\frac{m_2\,[m_2-1]\, a_2\,[a_2-1]\, n_2\,[n_2-1]\, \hat{C}\,[\hat{C}-1] R^2}{m_1\,[m_1-1]\, a_1\,[a_1-1]\, \hat{C}_T\,[\hat{C}_T-1]} \right] + \left[\frac{m_2\, a_2\, n_2\, \hat{C}\, R}{m_1\, a_1\, \hat{C}_T} \right] - \left[\frac{(m_2\, a_2\, n_2\, \hat{C}\, R)^2}{(m_1\, a_1\, \hat{C}_T)^2} \right] . \quad [21]$$

The estimated hatchery contribution of coho salmon in the escapement past the weir (N_h) was calculated as follows:

$$\hat{N}_h = ([a_1/n_2]/R)\ (N_p) \quad [22]$$

where:

a_1 = the number of marked coho salmon passed through the weir,
n_2 = the number of coho salmon passed through the weir which were examined for a clipped adipose fin,
R = the ratio of marked to unmarked smolts released, and
N_p = the number of coho salmon passed through the weir.

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[2] For the 1988 smolt release at Nancy Lake, R is equal to 0.081.

RESULTS

Creel Estimates

Direct expansion and roving creel surveys were used to estimate angler-effort (in hours) and coho salmon harvest and catch rate at each of the major access points to the Little Susitna River. A direct expansion creel survey was conducted only at the Burma Road access point to estimate angler-effort (in hours) and chinook salmon harvest and catch rate.

Coho salmon:

Burma Road. The direct expansion creel survey for coho salmon at the Burma Road access site was conducted from 16 July through 5 September. The number of anglers exiting the fishery at Burma Road during a surveyed period ranged from 0 to 200 (Appendix Table 1). The busiest parts of the day with respect to the number of anglers departing the fishery were periods C (1600 to 1959 hours) and D (2000 to 2400 hours). Estimated angler-effort during the survey for boat anglers exiting the fishery at Burma Road was 41,786 angler-hours of which 44% (18,221 angler-hours) occurred during the weekend/holiday component and 56% (23,564 angler-hours) during the weekday component (Table 3).

Daily harvest rates of coho salmon for boat anglers exiting the fishery at Burma Road ranged from 0.000 to 0.515 fish per hour (Appendix Table 2). The weekend component from 3 September to 5 September had the highest coho salmon harvest rate, 0.500 fish per hour for boat anglers (Table 4). Catch rates of coho salmon peaked from 3 September to 5 September for boat anglers, also (Table 4).

The estimated harvest of coho salmon by boat anglers exiting the fishery at Burma Road was 9,009 fish; 2,931 coho salmon (33%) were harvested during the weekend/holiday component and 6,078 coho salmon (67%) were harvested during the weekday component (Table 5). Boat anglers exiting the sport fishery in the Little Susitna River at Burma Road released about 10% of the coho salmon they had caught (Table 5).

Shore Anglers Near Burma Road. The roving creel survey of the shore anglers near Burma Road was conducted from 16 July to 5 September. Counts of shore anglers in the area near Burma Road ranged from 0 to 121 (Appendix Table 3). Estimated angler-effort during the survey was 23,393 angler-hours, 8,763 angler-hours (37%) during the weekend/holiday component and 14,630 angler-hours (63%) during the weekday component (Table 6). About 89% of the total effort occurred from 25 July to 19 August (Table 6).

Daily harvest rates of coho salmon for shore anglers exiting the fishery at Burma Road ranged from 0.000 to 0.412 fish per hour (Appendix Table 4). The weekday component from 22 August to 26 August had the highest coho salmon harvest rate, 0.215 fish per hour (Table 7). Catch rates of coho salmon peaked during the same period (Table 7).

Table 3. Estimated effort by boat anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988.

Component[1]		Effort in angler-hours	Standard Error	Relative Precision[2]
WE	716-717	1,155.3	210.2	35.7%
WD	718-722	1,390.6	271.2	38.2%
WE	723-724	2,112.6	197.3	18.3%
WD	725-729	5,740.0	560.5	19.1%
WE	730-731	6,295.3	290.7	9.1%
WD	801-805	8,682.2	288.0	6.5%
WE	806-807	4,023.7	210.0	10.2%
WD	808-812	4,349.0	659.7	29.7%
WE	813-814	3,262.3	50.0	3.0%
WD	815-819	2,655.7	350.7	25.9%
WE	820-821	1,092.7	111.7	20.0%
WD	822-826	714.1	207.3	56.9%
WE	827-828	253.5	91.5	70.7%
WD	829-902	32.5	27.6	166.7%
WE	903-905	26.0	11.0	82.9%
WE	Total	18,221.4	485.0	5.2%
WD	Total	23,564.1	1,035.7	8.6%
Grand Total		41,785.5	1,143.6	5.4%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

Table 4. Estimated rates of harvest and catch (fish per hour) of coho salmon by boat anglers exiting the sport fishery at the Little Susitna River access site, 1988.

Component[1]		Number of Interviews	Harvest Rate	Standard Error	Catch Rate	Standard Error
WE	716-717	157	0.0589	0.0123	0.0704	0.0128
WD	718-722	121	0.1614	0.0441	0.1614	0.0441
WE	723-724	318	0.2322	0.0144	0.2531	0.0167
WD	725-729	587	0.4317	0.0421	0.4971	0.0472
WE	730-731	783	0.1368	0.0068	0.1464	0.0079
WD	801-805	809	0.2150	0.0196	0.2355	0.0267
WE	806-807	561	0.1968	0.0093	0.2187	0.0114
WD	808-812	420	0.1972	0.0141	0.2110	0.0190
WE	813-814	474	0.1132	0.0086	0.1226	0.0095
WD	815-819	254	0.1682	0.0134	0.1992	0.0185
WE	820-821	175	0.2367	0.0182	0.3124	0.0279
WD	822-826	52	0.2882	0.0396	0.3287	0.0433
WE	827-828	29	0.2991	0.0453	0.3162	0.0487
WD	829-902	2	0.1111	0.0497	0.1111	0.0497
WE	903-905	6	0.5000	0.1179	0.5833	0.1443

[1] WD = weekday; WE = weekend/holiday.

Table 5. Estimated harvest and catch of coho salmon by boat anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988.

Component[1]		Harvest	Standard Error	Rel. Pre.[2]	Catch	Standard Error	Rel. Pre.[2]
WE	716-717	68	6.8	19.6%	82	111.1	265.6%
WD	718-722	225	61.1	53.2%	225	61.1	53.2%
WE	723-724	491	50.7	20.2%	535	66.7	24.4%
WD	725-729	2,478	254.6	20.1%	2,854	355.9	24.4%
WE	730-731	861	12.8	2.9%	922	17.2	3.7%
WD	801-805	1,861	154.7	16.3%	2,036	189.5	18.2%
WE	806-807	792	35.8	8.9%	880	54.0	12.0%
WD	808-812	858	116.2	26.5%	917	130.1	27.8%
WE	813-814	370	24.1	12.8%	400	21.8	10.7%
WD	815-819	446	54.6	24.0%	529	68.4	25.3%
WE	820-821	259	21.9	16.6%	342	27.4	15.7%
WD	822-826	206	47.3	45.0%	234	63.5	53.2%
WE	827-828	76	36.7	94.6%	80	33.5	82.1%
WD	829-902	4	3.1	151.9%	4	3.1	151.9%
WE	903-905	14	6.7	93.8%	16	6.4	78.4%
WE	Total	2,931	80.7	5.4%	3,257	149.6	9.0%
WD	Total	6,078	333.5	10.8%	6,799	438.1	12.6%
GRAND TOTAL		9,009	343.1	7.5%	10,056	463.0	9.0%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

Table 6. Estimated effort by shore anglers near the Burma Road access site for the sport fishery in the Little Susitna River, 1988.

Component[1]		Effort in angler-hours	Standard Error	Relative Precision[2]
WE	716-717	212.0	82.3	76.1%
WD	718-722	493.0	116.2	46.2%
WE	723-724	600.0	54.0	17.6%
WD	725-729	3,380.0	554.1	32.1%
WE	730-731	3,088.0	126.1	8.0%
WD	801-805	4,680.0	528.4	22.1%
WE	806-807	2,952.0	222.3	14.8%
WD	808-812	3,453.0	471.5	26.8%
WE	813-814	1,216.0	203.4	32.8%
WD	815-819	2,007.0	203.4	19.9%
WE	820-821	500.0	127.4	49.9%
WD	822-826	444.0	101.6	44.9%
WE	827-828	156.0	58.9	74.0%
WD	829-902	173.0	78.1	88.5%
WE	903-905	39.0	19.5	98.0%
WE	Total	8,763.0	369.4	8.3%
WD	Total	14,630.0	938.0	12.6%
Grand Total		23,393.0	1,008.1	8.4%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

Table 7. Estimated rates of harvest and catch (fish per hour) of coho salmon by interviewed shore anglers sport fishing near the Little Susitna River Burma Road access site, 1988.

Component[1]		Number of Interviews	Harvest Rate[2]	Standard Error	Catch Rate[2]	Standard Error
WE	716-717	13	0.0921	0.03676	0.0921	0.03676
WD	718-722	42	0.0294	0.01990	0.0294	0.01990
WE	723-724	55	0.0884	0.02068	0.0884	0.02068
WD	725-729	197	0.1448	0.01771	0.1473	0.01950
WE	730-731	214	0.0876	0.01112	0.0876	0.01120
WD	801-805	236	0.1031	0.01140	0.1062	0.01211
WE	806-807	225	0.1380	0.01339	0.1401	0.01359
WD	808-812	212	0.0824	0.01372	0.0824	0.01372
WE	813-814	126	0.0445	0.01135	0.0524	0.01342
WD	815-819	163	0.1699	0.04859	0.2073	0.06417
WE	820-821	99	0.1029	0.02403	0.1029	0.02403
WD	822-826	23	0.2147	0.07524	0.2260	0.07658
WE	827-828	29	0.1905	0.03585	0.1905	0.03585
WD	829-902	9	0.0606	0.04042	0.0606	0.04042
WE	903-905	16	0.0938	0.10143	0.2188	0.13944

[1] WD = weekday; WE = weekend/holiday.

[2] Harvest and catch rates of interviewed shore anglers.

The estimated harvest of coho salmon by shore anglers fishing near the Burma Road access site was 2,607 fish; 890 coho salmon (34%) were harvested during the weekend/holiday component and 1,717 coho salmon (66%) were harvested during the weekday component (Table 8). Shore anglers released only about 5% of the coho salmon they had caught.

Miller's Landing. The direct expansion creel survey at the access site at Miller's Landing was conducted from 30 July to 5 September. The number of anglers exiting the fishery in the Little Susitna River at Miller's Landing during a surveyed period ranged from 0 to 20 (Appendix Table 5). Most anglers exited the fishery through Miller's Landing during period B. Estimated angler-effort during the survey was 4,302 angler-hours, 1,857 angler-hours (43%) during the weekend/holiday component and 1,445 angler-hours (57%) during the weekday component (Table 9).

Daily harvest rates of coho salmon for anglers exiting the fishery at Miller's Landing ranged from 0.000 to 0.286 fish per hour (Appendix Table 6). The weekday component from 29 August to 2 September had the highest coho salmon harvest rate, 0.278 fish per hour (Table 10). Catch rates of coho salmon peaked during the same period (Table 10).

The estimated harvest of coho salmon by anglers exiting the fishery at Miller's Landing was 443 fish; 177 coho salmon (40%) were harvested during the weekend/holiday component and 266 coho salmon (60%) were harvested during the weekday component (Table 11). Anglers exiting the sport fishery in the Little Susitna River at Miller's Landing had released about 30% of the coho salmon they had caught.

Ship Creek. The direct expansion creel survey at the Ship Creek access site was conducted from 16 July to 21 August. The number of anglers exiting the fishery in the Little Susitna River at Ship Creek during a surveyed period ranged from 0 to 51 (Appendix Table 7). Estimated angler-effort during the survey was 3,894 angler-hours; 1,852 angler-hours (48%) during the weekend/holiday component and 2,042 angler-hours (52%) during the weekday component (Table 12).

Daily harvest rates of coho salmon for anglers exiting the fishery at Ship Creek ranged from 0.046 to 0.354 fish per hour (Appendix Table 8). The weekday component from 15 August to 19 August had the highest coho salmon harvest rate, 0.329 fish per hour (Table 13). Catch rates of coho salmon peaked from 15 August to 19 August, also (Table 13).

The estimated harvest of coho salmon by anglers exiting the fishery at Ship Creek was 700 fish; 297 coho salmon (42%) were harvested during the weekend/holiday component and 403 coho salmon (58%) were harvested during the weekday component (Table 14). Anglers exiting the sport fishery in the Little Susitna River at Miller's Landing had released about 3% of the coho salmon they had caught.

Summary. When the estimates from all creel surveys are totaled, there were an estimated 73,665 angler-hours of effort by the sport fishery in the Little Susitna River during the creel survey period; 12,759 coho salmon were

Table 8. Estimated harvest and catch of coho salmon by shore anglers fishing near the Burma Road access site in the Little Susitna River, 1988.

Component[1]		Harvest	Standard Error	Rel. Pre.[2]	Catch	Standard Error	Rel. Pre.[2]
WE	716-717	20	10.4	102.3%	20	10.4	102.3%
WD	718-722	14	10.1	141.8%	14	10.1	141.8%
WE	723-724	53	13.2	49.0%	53	13.2	49.0%
WD	725-729	489	99.6	39.9%	498	104.3	41.1%
WE	730-731	271	36.0	26.1%	271	36.3	26.2%
WD	801-805	483	76.0	30.8%	497	79.5	31.3%
WE	806-807	407	50.0	24.1%	414	50.7	24.0%
WD	808-812	285	60.9	41.9%	285	60.9	41.9%
WE	813-814	54	16.3	59.3%	64	19.3	59.1%
WD	815-819	341	103.0	59.2%	416	134.9	63.6%
WE	820-821	51	17.5	67.3%	51	17.5	67.3%
WD	822-826	95	39.2	80.8%	100	40.3	79.0%
WE	827-828	30	12.4	80.7%	30	12.4	80.7%
WD	829-902	10	7.8	153.5%	10	7.8	153.5%
WE	903-905	4	3.9	190.3%	9	6.4	138.4%
WE	Total	890	69.4	15.3%	912	71.0	15.3%
WD	Total	1,717	178.1	20.3%	1,820	202.2	21.8%
GRAND TOTAL		2,607	191.1	14.4%	2,732	214.3	15.4%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

Table 9. Estimated effort by anglers exiting the sport fishery in the Little Susitna River at the Miller's Landing access site, 1988.

Component[1]		Effort in angler-hours	Standard Error	Relative Precision[2]
WE	730-731	304.0	31.3	20.2%
WD	801-805	847.6	147.1	34.0%
WE	806-807	389.3	28.2	14.2%
WD	808-812	862.8	305.8	69.5%
WE	813-814	616.0	34.9	11.1%
WD	815-819	521.0	106.0	39.9%
WE	820-821	402.3	133.1	64.8%
WD	822-826	144.8	62.4	84.5%
WE	827-828	145.1	93.1	125.8%
WD	829-902	68.6	58.9	168.3%
WE	903-905	0.0	0.0	
WE	Total	1,856.7	171.4	18.1%
WD	Total	2,444.8	365.7	29.3%
GRAND TOTAL		4,301.5	403.9	18.4%

1 WD = weekday; WE = weekend/holiday.

2 Relative precision of 95% confidence interval.

Table 10. Estimated rates of harvest and catch (fish per hour) of coho salmon by anglers exiting the sport fishery in the Little Susitna River at the Miller's Landing access site, 1988.

Component[1]		Number of Interviews	Harvest Rate	Standard Error	Catch Rate	Standard Error
WE	730-731	29	0.0150	0.01184	0.0150	0.01184
WD	801-805	41	0.0092	0.00677	0.0092	0.00677
WE	806-807	34	0.0294	0.01192	0.0294	0.01192
WD	808-812	45	0.1413	0.04818	0.1413	0.04818
WE	813-814	41	0.1262	0.02715	0.1262	0.02715
WD	815-819	28	0.2048	0.03608	0.2121	0.03590
WE	820-821	28	0.1136	0.03459	0.1307	0.03569
WD	822-826	8	0.0789	0.06092	0.4474	0.25602
WE	827-828	12	0.2520	0.04054	0.6772	0.12285
WD	829-902	3	0.2778	0.06573	1.1667	0.12910
WE/H	903-905	0	0.0000	0.00000	0.0000	0.00000

[1] WD = weekday; WE = weekend/holiday.

Table 11. Estimated harvest and catch of coho salmon by anglers exiting the sport fishery in the Little Susitna River at the Miller's Landing access site, 1988.

Component[1]		Harvest	Standard Error	Rel. Pre.[2]	Catch	Standard Error	Rel. Pre.[2]
WE	730-731	5	3.4	133.3%	5	3.4	133.3%
WD	801-805	8	6.5	159.3%	8	6.4	156.8%
WE	806-807	11	5.1	90.9%	11	5.1	90.9%
WD	808-812	122	56.3	90.4%	122	56.3	90.4%
WE	813-814	78	17.5	44.0%	78	17.5	44.0%
WD	815-819	106	24.9	46.0%	110	24.5	43.7%
WE	820-821	46	12.1	51.6%	52	13.8	52.0%
WD	822-826	11	9.8	174.6%	65	41.8	126.0%
WE	827-828	37	27.4	145.1%	98	62.9	125.8%
WD	829-902	19	16.4	169.2%	80	68.7	168.3%
WE	903-905	0			0		
WE	Total	177	35.2	39.0%	244	66.9	53.8%
WD	Total	266	64.8	47.7%	385	101.4	51.6%
GRAND TOTAL		443	73.7	32.6%	629	121.5	37.9%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

Table 12. Estimated effort by anglers exiting the sport fishery in the Little Susitna River at the Ship Creek access site, 1988.

Component[1]		Effort in angler-hours	Standard Error	Relative Precision[2]
WE	716-717	189.0	0.0[3]	
WD	718-722	40.0	25.3	124.0%
WE	723-724	461.5	0.0[3]	
WD	725-729	692.1	177.0	50.1%
WE	730-731	805.3	0.0[3]	
WD	801-805	736.7	151.0	40.2%
WE	806-807	171.0	0.0[3]	
WD	808-812	446.7	203.5	89.3%
WE	813-814	201.0	0.0[3]	
WD	815-819	126.7	65.5	101.3%
WE	820-821	24.0	0.0[3]	
WE	Total	1,851.8	0.0[3]	
WD	Total	2,042.2	317.0	30.4%
GRAND TOTAL		3,894.0	317.0	16.0%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

[3] Standard error equals 0.0 because all hours possible were censused.

Table 13. Estimated rates of harvest and catch (fish per hour) of coho salmon by anglers exiting the sport fishery in the Little Susitna River at the Ship Creek access site, 1988.

Component[1]		Number of Interviews	Harvest Rate	Standard Error	Catch Rate	Standard Error
WE	716-717	17	0.0741	0.02602	0.0741	0.02602
WD	718-722	3	0.0833	0.01863	0.0833	0.01863
WE	723-724	37	0.1972	0.01895	0.2340	0.02211
WD	725-729	45	0.2914	0.01872	0.2986	0.02136
WE	730-731	95	0.1552	0.01559	0.1565	0.01565
WD	801-805	44	0.0950	0.03810	0.0950	0.03810
WE	806-807	18	0.1754	0.02885	0.1754	0.02885
WD	808-812	18	0.1978	0.04703	0.1978	0.04703
WE	813-814	28	0.1542	0.02270	0.1542	0.02270
WD	815-819	8	0.3289	0.02366	0.3289	0.02366
WE	820-821	2	0.2500	0.00000	0.2500	0.00000

[1] WD = weekday; WE = weekend/holiday.

Table 14. Estimated harvest and catch of coho salmon by anglers exiting the sport fishery in the Little Susitna River at the Ship Creek access site, 1988.

Component[1]	Harvest	Standard Error	Rel. Pre.[2]	Catch	Standard Error	Rel. Pre.[2]
WE 716-717	14	0.0	0.0%	14	0.0	0.0%
WD 718-722	3	2.1	137.2%	3	2.1	137.2%
WE 723-724	91	0.0	0.0%	108	0.0	0.0%
WD 725-729	201	45.0	43.9%	206	45.1	42.9%
WE 730-731	125	0.0	0.0%	126	0.0	0.0%
WD 801-805	70	16.2	45.4%	70	16.2	45.4%
WE 806-807	30	0.0	0.0%	30	0.0	0.0%
WD 808-812	88	39.7	88.4%	88	39.7	88.4%
WE 813-814	31	0.0	0.0%	31	0.0	0.0%
WD 815-819	41	21.7	103.7%	41	21.7	103.7%
WE 820-821	6	0.0	0.0%	6	0.0	0.0%
WE Total	297	0.0	0.0%	315	0.0	0.0%
WD Total	403	65.9	32.0%	408	65.9	31.7%
GRAND TOTAL	700	65.9	18.4%	723	65.9	17.9%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

[3] Standard error equals 0.0 because all hours possible were censused.

harvested and 14,140 coho salmon were caught (Table 15). Boat anglers exiting the fishery through the Burma Road access site were responsible for the majority of the angler-effort (57%), coho salmon harvest (71%), and coho salmon catch (71%) (Figure 2). Shore anglers fishing near Burma Road were the next largest component of the fishery. These shore anglers were responsible for 32% of the angler-effort, 20% of the coho salmon harvest, and 19% of the coho salmon catch. Anglers exiting the fishery at either the Miller's Landing or Ship Creek access sites were responsible for less than 6% of the effort and coho salmon catch. For the entire fishery, 10% of the coho salmon caught by anglers (1,381 fish) were released.

Angler-effort and harvest and catch of coho salmon by unguided boat anglers, guided boat anglers, and shore anglers exiting at the Burma Road access site were estimated. Nearly all guided anglers participating in the sport fishery in the Little Susitna River use this site; most anglers using commercial services at Miller's Landing are being transported to fishing areas and are not being guided in the fishing effort. No commercial guide or charter service is conducted from Ship Creek. Guided boat anglers exiting the fishery at Burma Road expended 2,898 (5%) of the angler-hours of effort from interviewed Burma Road anglers (Table 16, Figure 3). Guided boat anglers harvested 10% of the coho salmon harvested by interviewed anglers and 10% of the coho salmon caught by interviewed anglers exiting the fishery at Burma Road.

Chinook Salmon:

The direct expansion creel survey for chinook salmon at the Burma Road access site was conducted from 4 June through 6 July 1988. The number of anglers exiting the fishery in the Little Susitna River at Burma Road during a surveyed period ranged from 0 to 161 (Appendix Table 9). The busiest parts of the day with respect to the number of anglers departing the fishery were periods B (1200 to 1759 hours) and C (1800 to 2400 hours). Estimated angler-effort during the survey was 42,955 angler-hours of which 20,119 angler-hours (49%) occurred during the weekend/holiday component and 22,836 angler-hours (53%) during the weekday component (Table 17).

Daily harvest rates of chinook salmon for anglers exiting the fishery at Burma Road ranged from 0.013 to 0.080 fish per hour (Appendix Table 10). The weekday component from 6 June to 10 June had the highest chinook salmon harvest rate, 0.0615 fish per hour (Table 18). Catch rates of chinook salmon peaked from 27 June to 1 July (Table 18).

The estimated harvest of chinook salmon by anglers exiting the fishery at Burma Road was 1,960 fish of which 35.5% (695) were harvested during the weekend/holiday component and 64.5% (1,265) were harvested during the weekday component (Table 19, Figure 4). Anglers exiting the sport fishery in the Little Susitna River at Burma Road released about 34% of the chinook salmon they had caught (Table 19).

Angler-effort and harvest and catch of chinook salmon by unguided boat anglers, guided boat anglers, and shore anglers exiting at the Burma Road access site were estimated. Nearly all guided anglers participating in the

Table 15. Summary of estimated angler-effort (angler-hours), coho salmon harvest, and coho salmon catch for the creel surveys of the sport fishery in the Little Susitna River, 1988.

Location	Effort in Angler-Hours	Relative Precision[1]	Harvest	Relative Precision[1]	Catch	Relative Precision[1]
Burma Road Boat Anglers	42,077	5.3%	9,009	7.5%	10,056	9.0%
Shore Anglers near Burma Road	23,393	8.4%	2,607	14.4%	2,732	15.4%
Miller's Landing	4,302	18.4%	443	32.6%	629	37.9%
Ship Creek	3,894	16.0%	700	18.4%	723	17.9%
Total	73,665	4.3%	12,759	6.2%	14,140	7.3%

[1] Relative precision of 95% confidence interval.

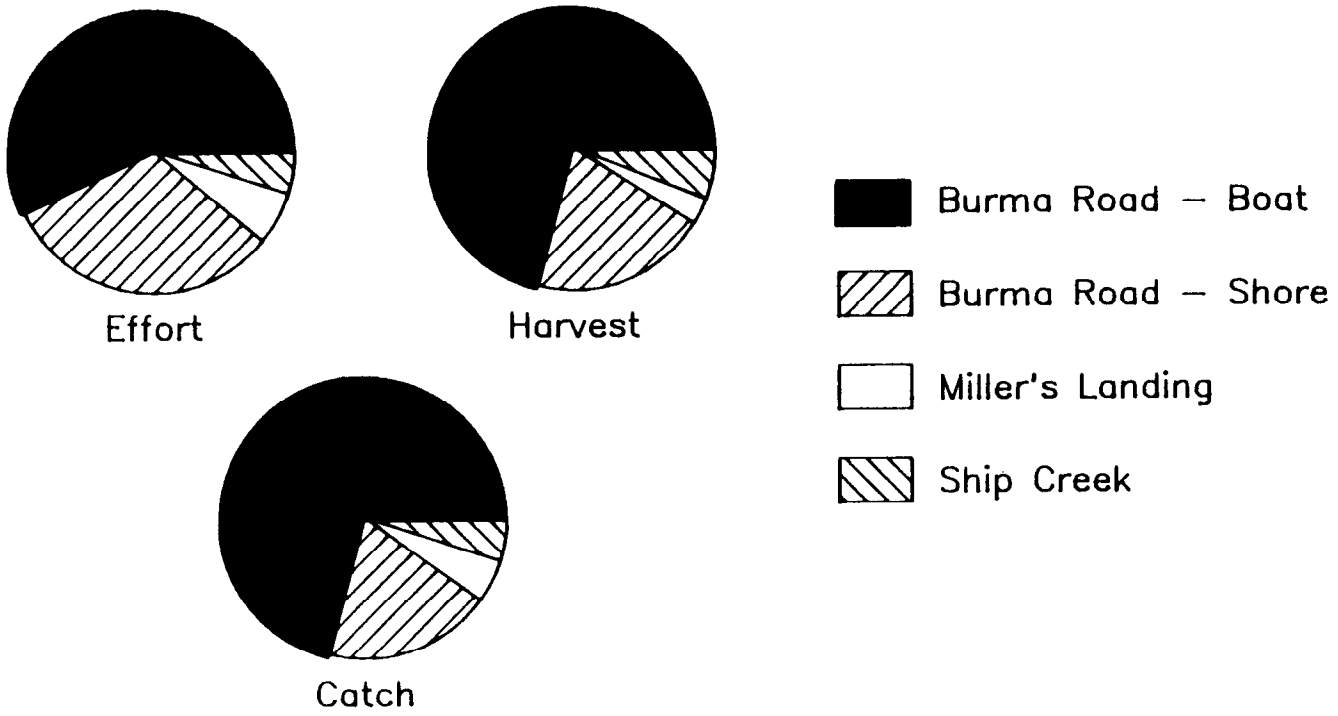

Figure 2. Percent of angler-effort, coho salmon harvest, and coho salmon catch by anglers exiting the sport fishery in the Little Susitna River at Burma Road, Miller's Landing, and Ship Creek and by shore anglers fishing near Burma Road, 1988.

Table 16. Estimated effort (angler-hours), coho salmon harvest, and coho salmon catch by unguided boat anglers, guided boat, and shore anglers exiting the sport fishery in the Little Susitna River at Burma Road, 1988.

Group	Effort	Standard Error	Harvest	Standard Error	Catch	Standard Error
UNGUIDED						
Boat Anglers	38,888	1,091.8	8,003	321.6	8,875	422.5
Shore anglers	11,874	623.1	1,367	80.2	1,448	88.6
GUIDED						
Boat Anglers	2,898	253.8	1,006	82.6	1,181	100.9
TOTAL	53,660	1,282.5	10,376	341.6	11,504	443.3

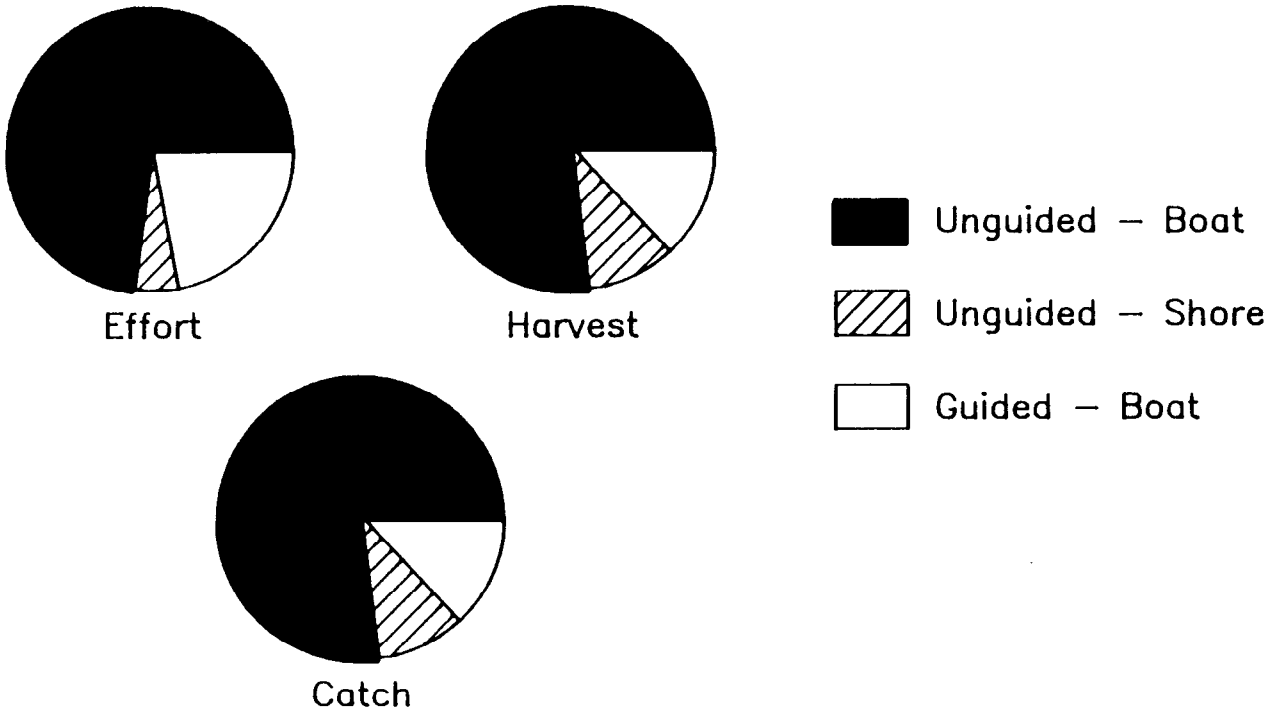

Figure 3. Percent of angler-effort, coho salmon harvest, and coho salmon catch by unguided boat anglers, guided boat anglers, and shore anglers exiting the sport fishery in the Little Susitna River at Burma Road, 1988.

Table 17. Estimated effort by chinook salmon anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988.

Component[1]		Effort in angler-hours	Standard Error	Relative Precision[2]
WE	604-605	5,314.1	856.2	31.6%
WD	606-610	6,818.5	456.1	13.1%
WE	611-612	5,422.2	886.2	32.0%
WD	613-617	8,204.9	1,493.1	35.7%
WE	618-619	4,887.3	709.1	28.4%
WD	620-624	5,361.3	1,061.8	38.8%
WE	625-626	2,613.7	399.7	30.0%
WD	627-701	1,933.3	599.5	60.8%
WE	702-704	1,881.6	291.5	30.4%
WD	705-706	518.4	202.9	76.7%
WE	Total	20,118.9	1,505.3	14.7%
WD	Total	22,836.4	1,991.3	17.1%
Grand	Total	42,955.3	2,496.3	11.4%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

Table 18. Estimated rates of harvest and catch (fish per hour) of chinook salmon by anglers exiting the sport fishery at the Little Susitna River access site, 1988.

Component[1]		Number of Interviews	Harvest Rate	Standard Error	Catch Rate	Standard Error
WE	604-605	465	0.0168	0.0026	0.0168	0.0026
WD	606-610	384	0.0615	0.0063	0.0758	0.0102
WE	611-612	440	0.0445	0.0044	0.0539	0.0066
WD	613-617	399	0.0573	0.0071	0.0869	0.0131
WE	618-619	426	0.0302	0.0035	0.0523	0.0081
WD	620-624	341	0.0463	0.0049	0.0740	0.0081
WE	625-626	283	0.0544	0.0066	0.0831	0.0126
WD	627-701	133	0.0556	0.0149	0.1755	0.0674
WE	702-704	235	0.0325	0.0060	0.0649	0.0110
WD	705-706	45	0.0370	0.0128	0.0417	0.0199

[1] WD = weekday; WE = weekend/holiday.

Table 19. Estimated harvest and catch of chinook salmon by anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988.

Component[1]	Harvest	Standard Error	Rel. Pre.[2]	Catch	Standard Error	Rel. Pre.[2]
WE 604-605	90	16.7	36.4%	90	16.7	36.4%
WD 606-610	417	64.6	30.4%	509	99.3	38.2%
WE 611-612	245	50.9	40.7%	301	69.7	45.4%
WD 613-617	465	101.3	42.7%	709	76.5	21.1%
WE 618-619	156	54.4	68.3%	274	123.8	88.6%
WD 620-624	255	47.5	36.5%	409	71.6	34.3%
WE 625-626	141	42.3	58.8%	213	64.3	59.2%
WD 627-701	109	35.3	63.5%	339	133.5	77.2%
WE 702-704	63	12.7	39.5%	124	37.0	58.5%
WD 705-706	19	5.8	59.8%	19	5.8	59.8%
WE Total	695	88.2	24.9%	1,002	161.1	31.5%
WD Total	1,265	134.1	20.8%	1,985	196.7	19.4%
GRAND TOTAL	1,960	160.5	16.0%	2,987	254.3	16.7%

[1] WD = weekday; WE = weekend/holiday.

[2] Relative precision of 95% confidence interval.

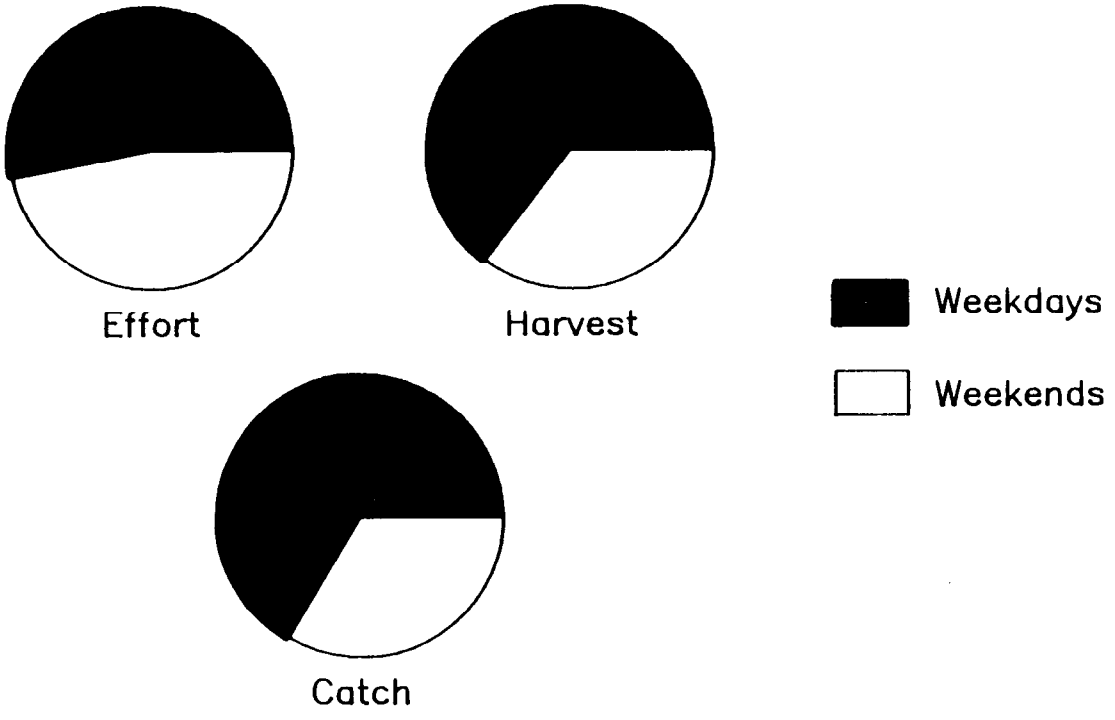

Figure 4. Percent of angler-effort, chinook salmon harvest, and chinook salmon catch by anglers exiting the sport fishery in the Little Susitna River at Burma Road during weekdays and weekends, 1988.

sport fishery in the Little Susitna River use this site; most anglers using commercial services at Miller's Landing are being transported to fishing areas and are not being guided in the fishing effort. No commercial guide or charter service is conducted from Ship Creek. Guided boat anglers exiting the fishery at Burma Road expended 1,072 (2%) of the angler-hours of effort (Table 20, Figure 5). Guided boat anglers harvested 7% of the chinook salmon harvested and 8% of the chinook salmon caught exiting the fishery at Burma Road.

Gear Type

Seventy-six percent of the coho salmon harvested downstream of Burma Road during 1988 were estimated to have been taken with bait. Boat anglers fishing downstream of Burma Road and exiting the sport fishery at Burma Road harvested approximately 85% of their coho salmon using bait. Shore anglers fishing downstream of Burma Road harvested approximately 41% of their coho salmon using bait and anglers exiting the sport fishery through Ship Creek harvested approximately 89% of their coho salmon using bait (Figure 6). Separation of anglers by gear type was not recorded during the chinook salmon creel survey.

Escapement

From 2 June through 12 September, 7,712 chinook salmon, 2,642 sockeye salmon, 23,677 chum salmon, 21,438 coho salmon, and 15,644 pink salmon were passed through the weir at river km 55.5 (Appendix Table 11).

The escapement of coho salmon through the weir, adjusted for the estimated harvest of coho salmon by sport anglers fishing upstream of the weir and exiting the sport fishery at Burma Road and at Miller's Landing was 20,491 fish. Fifty percent of the coho salmon escapement through the weir occurred before 13 August. Coho salmon are not known to spawn downstream of the weir.

Counts of coho salmon escapement into index areas of the Little Susitna River were not conducted during 1988 because of persistent inclement weather during the peak spawning period. Counts of coho salmon in the index areas of other Matanuska-Susitna Valley streams ranged from 30 to 1,911 fish (Appendix Table 12). The observed escapement of chinook salmon to index areas in the upper reaches of the Little Susitna River are reported by Hepler et. al. (in press).

The escapement of chinook salmon to the Little Susitna River adjusted for the estimated harvest of chinook salmon by sport anglers fishing upstream of the weir and exiting the fishery at Burma Road was 7,374 fish. This figure does not consider harvest by unsurveyed fisheries from Miller's Landing and near Houston at river km 111.7. An additional peak count of 128 chinook salmon were observed spawning in the 5.5 km reach of the Little Susitna River between the Burma Road access and the weir. Fifty percent of the chinook salmon escapement through the weir occurred before 18 June.

Table 20. Estimated effort (angler-hours), chinook salmon harvest, and chinook salmon catch by unguided boat anglers, guided boat, and shore anglers exiting the sport fishery in the Little Susitna River at Burma Road, 1988.

Group	Effort	Standard Error	Harvest	Standard Error	Catch	Standard Error
UNGUIDED						
Boat Anglers	30,606	2,123.2	1,513	131.4	2,334	218.6
Shore anglers	12,135	739.5	293	40.0	348	50.6
GUIDED						
Boat Anglers	1,072	221.2	135	28.6	222	48.1
TOTAL	43,812	2,259.2	1,941	140.3	2,904	229.5

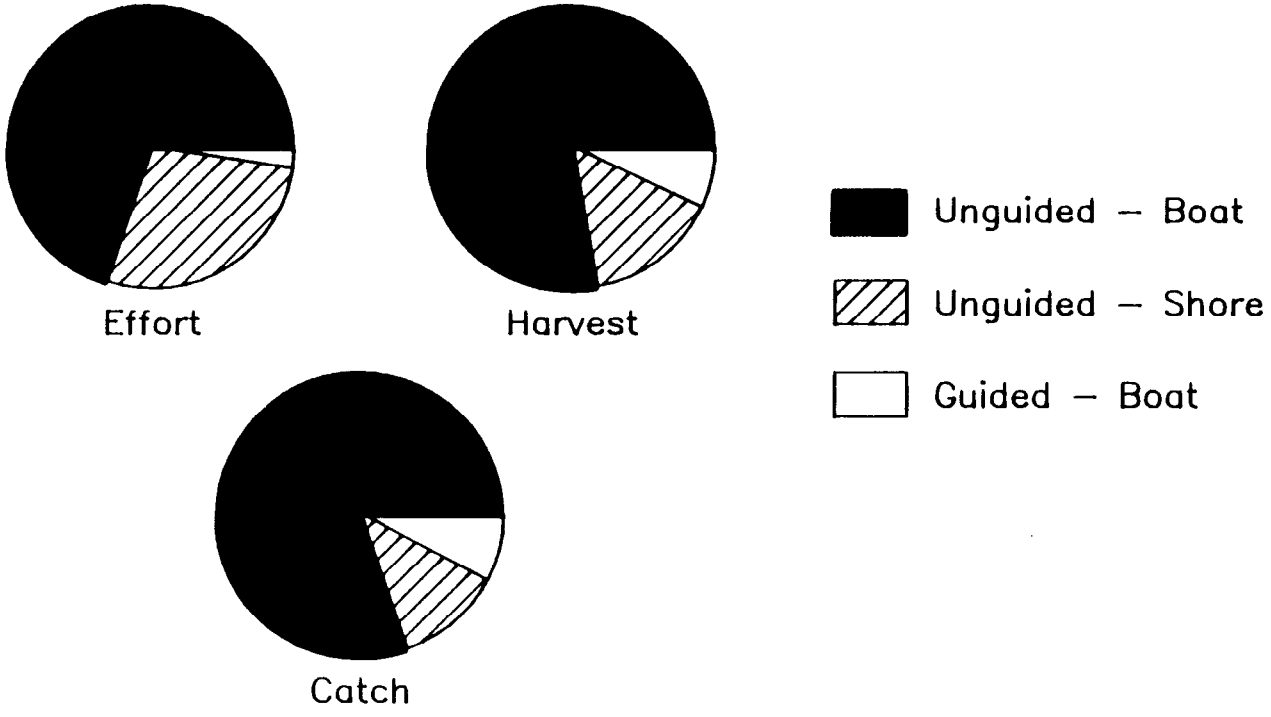

Figure 5. Percent of angler-effort, chinook salmon harvest, and chinook salmon catch by unguided boat anglers, guided boat anglers, and shore anglers exiting the sport fishery in the Little Susitna River at Burma Road, 1988.

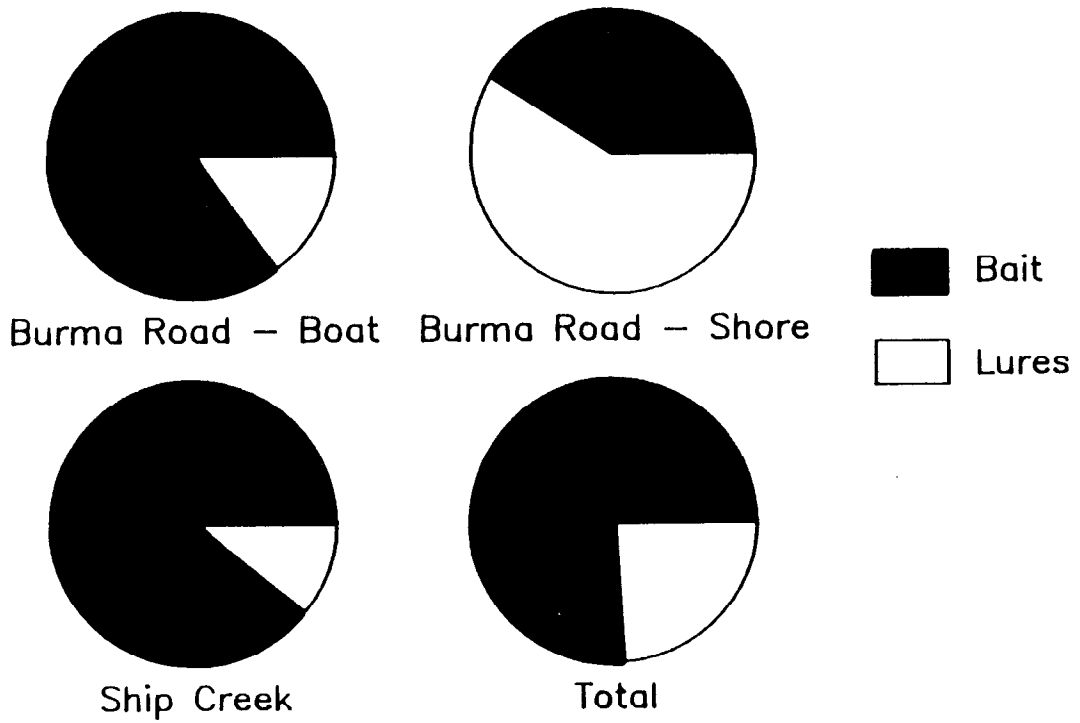

Figure 6. Percent of total estimated harvest of coho salmon by boat anglers using bait and lures downstream of Burma Road and exiting the sport fishery at Burma Road and Ship Creek and shore anglers downstream of Burma Road on the Little Susitna River, 1988.

Age, Sex, and Length Compositions

Chinook and coho salmon were randomly sampled for age, sex, and length information from the escapement passed at the weir and harvest in the sport fishery.

Coho Salmon:

A total of 375 coho salmon from the sport harvest were identified to sex and their scales aged. Males and females represented 44.0% and 56.0% of the sample, respectively (Table 21). Age 2.1 coho salmon were the most abundant age group comprising 71.2% of the sample. Age groups 1.1 and 3.1 comprised the remainder of the sample.

A total of 322 coho salmon from the escapement past the weir were identified to sex, and their scales aged. Males and females represented 50.9% and 49.1% of the sample, respectively (Table 22). Age 2.1 coho salmon were the most abundant age group as they comprised 77.0% of the sample. Age groups 1.1 and 3.1 comprised the remainder of the sample. There was no significant difference ($P > 0.05$) in age composition between the harvest and escapement.

Mean lengths at age of male and female coho salmon sampled from the sport harvest were similar (Tables 23 and 24).

Chinook Salmon:

A total of 326 chinook salmon from the sport harvest at Burma Road were identified to sex and their scales aged. Males and females represented 46.6% and 53.4% of the sample, respectively (Table 25). Age 1.4 chinook salmon were the most abundant age group comprising 69.3% of the sample. Age group 1.3 was the second most abundant, comprising 22.1% of the sample. Age groups 1.1, 1.2, 1.5, and 2.4 comprised the remainder of the sample.

A total of 375 chinook salmon from the escapement at the weir were identified to sex, and their scales aged. Males and females represented 49.9% and 54.1% of the sample, respectively (Table 26). Age 1.4 chinook salmon were the most abundant age group comprising 73.3% of the sample. Age groups 1.2 and 1.3 comprised the remainder of the sample. There was no significant difference ($P > 0.05$) in age composition between the harvest and escapement.

Mean lengths at age of male and female chinook salmon sampled from the sport harvest and the escapement at the weir were similar (Tables 27 and 28).

Hatchery Contributions

A total of 3,020 coho salmon from the sport fishery were examined for a missing adipose fin of which 133 were observed to have a missing adipose fin. Of these, 113 had their heads removed and sent to the FRED Division CWT lab for processing. A total of 105 fish had coded-wire tags which were present and decodeable. All tags were decodeable to the 1987 Nancy Lake smolt release. Based on these data, the estimated contribution of hatchery-produced coho

Table 21. Sex and age composition of coho salmon sampled from the sport fishery in the Little Susitna River, 1988.

	Age Group				
	1.1	2.1	3.1	4.1	Total
Females:					
Number in Sample	26	148	35	1	210
Percentage	6.9	39.5	9.3	0.3	56.0
Standard Error[1]	1.0	3.0	2.0	0.0	3.0
Males:					
Number in Sample	22	1192	24		165
Percentage	5.9	31.7	6.4		44.0
Standard Error[1]	1.0	2.0	1.0		3.0
Sexes Combined:					
Number in Sample	48	267	59	1	375
Percentage	12.8	71.2	15.7	0.3	100.0
Standard Error[1]	2.0	2.0	2.0	0.0	

[1] Standard error of proportional estimate X 100.

Table 22. Sex and age composition of coho salmon sampled from the escapement (weir) in the Little Susitna River, 1988.

	Age Group			
	1.1	2.1	3.1	Total
Females:				
Number in Sample	24	118	16	158
Percentage	7.5	36.6	5.0	49.1
Standard Error[1]	1.0	3.0	1.0	3.0
Males:				
Number in Sample	22	130	12	164
Percentage	6.8	40.4	3.7	50.9
Standard Error[1]	1.0	3.0	1.0	3.0
Sexes Combined:				
Number in Sample	46	248	28	322
Percentage	14.3	77.0	8.7	100.0
Standard Error[1]	2.0	2.0	2.0	

[1] Standard error of proportional estimate X 100.

Table 23. Mean length (in centimeters) by sex and age group of coho salmon sampled from the sport fishery in the Little Susitna River, 1988.

	Age Group			
	1.1	2.1	3.1	4.1
Females:				
Mean	59.5	59.5	60.5	60.0
Standard Error	6.6	2.7	5.1	
Sample Size	26	147	35	1
Minimum	50.0	45.0	52.0	60.0
Maximum	65.0	68.5	66.0	60.0
Males:				
Mean	59.5	60.0	62.0	
Standard Error	7.9	3.7	7.4	
Sample Size	21	119	24	
Minimum	52.0	45.0	51.0	
Maximum	67.0	67.0	67.0	

Table 24. Mean length (in centimeters) by sex and age group of coho salmon sampled from the escapement (weir) in the Little Susitna River, 1988.

	Age Group		
	1.1	2.1	3.1
Females:			
Mean	58.5	59.0	59.0
Standard Error	3.6	2.8	6.4
Sample Size	24	117	16
Minimum	54.0	49.0	53.0
Maximum	61.0	66.0	63.0
Males:			
Mean	59.5	61.0	62.0
Standard Error	6.4	2.8	6.9
Sample Size	22	130	12
Minimum	55.0	50.0	58.0
Maximum	66.0	68.0	67.0

Table 25. Sex and age composition of chinook salmon sampled from the sport fishery in the Little Susitna River, 1988.

	Age Group						
	1.1	1.2	1.3	1.4	1.5	2.4	TOTAL
Females:							
Number in Sample		3	41	129		1	174
Percentage		0.9	12.6	39.6		0.3	53.4
Standard Error[1]		1.0	2.0	3.0		0.0	3.0
Males:							
Number in Sample	3	20	31	97	1		152
Percentage	0.9	6.1	9.5	29.8	0.3		46.6
Standard Error[1]	1.0	1.0	2.0	3.0	0.0		3.0
Sexes Combined:							
Number in Sample	3	23	72	226	1	1	326
Percentage	0.9	7.1	22.1	69.3	0.3	0.3	100.0
Standard Error[1]	1.0	1.0	2.0	3.0	0.0	0.0	

[1] Standard error of proportional estimate X 100.

Table 26. Sex and age composition of chinook salmon sampled from the escapement (weir) in the Little Susitna River, 1988.

	Age Group			
	1.2	1.3	1.4	Total
Females:				
Number in Sample	2	37	164	203
Percentage	0.5	9.9	43.7	54.1
Standard Error[1]	0.0	2.0	3.0	3.0
Males:				
Number in Sample	23	38	111	172
Percentage	6.1	10.1	29.6	49.9
Standard Error[1]	1.0	2.0	2.0	3.0
Sexes Combined:				
Number in Sample	25	75	275	375
Percentage	6.7	20.0	73.3	100.0
Standard Error[1]	1.0	2.0	2.0	

[1] Standard error of proportional estimate X 100.

Table 27. Mean length (in centimeters) by sex and age group of chinook salmon sampled from the sport fishery in the Little Susitna River, 1988.

	Age Group					
	1.1	1.2	1.3	1.4	1.5	2.4
Females:						
Mean		69.0	81.0	91.0		101.0
Standard Error		60.0	9.5	5.8		
Sample Size		3	41	129		1
Minimum		61.5	67.5	67.0		101.0
Maximum		81.0	99.5	111.0		101.0
Males:						
Mean	33.0	59.5	82.5	98.5	106.5	
Standard Error	29.2	16.1	13.9	6.3		
Sample Size	3	20	31	97	1	
Minimum	30.0	41.0	69.0	66.0	106.5	
Maximum	39.0	70.0	104.0	113.0	106.5	

Table 28. Mean length (in centimeters) by sex and age group of chinook salmon sampled from the escapement (weir) in the Little Susitna River, 1988.

	Age Group		
	1.2	1.3	1.4
Females:			
Mean	65.5	81.5	91.5
Standard Error	5.0	10.5	4.1
Sample Size	2	37	164
Minimum	65.0	66.0	70.0
Maximum	66.0	94.0	105.0
Males:			
Mean	61.5	81.5	97.5
Standard Error	12.1	13.0	6.0
Sample Size	23	38	111
Minimum	47.0	56.0	79.0
Maximum	71.0	99.0	109.0

salmon to the sport harvest in the Little Susitna River during 1988 was 6,468 fish (Table 29). This represents 51% of the total harvest of coho salmon in the river.

A total of 1,061 coho salmon from the escapement past the weir were examined for a missing adipose fin, of which 19 were observed to have a missing adipose. Based on these data, the hatchery contribution to the escapement of 21,438 coho salmon was estimated to be 4,764 fish or about 22% of the total escapement past the weir (Table 29). No heads were collected from coho salmon missing their adipose fins passed through the weir. We assume, however, based on tag decoding information obtained in the sport fishery recoveries, that these fish originated from the 1987 Nancy Lake smolt release.

DISCUSSION

Coho Salmon

The estimated 73,665 angler-hours of effort for coho salmon was the largest on record for the Little Susitna River, while the estimated harvest of 12,759 coho salmon harvest was the second largest since 1981. Effort increased 22% over that estimated in 1987 while the harvest increased 5% (Bartlett and Conrad 1988). An estimated 51% of the 1988 harvest originated from the 1987 Nancy Lake smolt release.

The estimated total return of coho salmon to the Little Susitna River during 1988 was 33,250. This is based on an estimated escapement of 20,491 coho salmon above the weir, an estimated sport harvest of 947 coho salmon above the weir, and an estimated sport harvest of 11,812 coho salmon below the weir. Coho salmon are not known to spawn downstream of the weir. Based on total estimated sport harvest of 12,759, this represents a minimum inriver exploitation rate by the sport fishery of 38%. As was the case for chinook salmon, it is not possible at this time to estimate total return or exploitation rate as an unknown number of coho salmon are harvested in the mixed-stock commercial fisheries of upper Cook Inlet.

An estimated 22% of the escapement of 21,438 coho salmon past the weir originated from stocking efforts. Based on tag decoding information obtained in the sport fishery recoveries, these fish originated from the 1987 Nancy Lake smolt release.

Chinook Salmon

The estimated 42,955 angler-hours of effort for chinook salmon was the second largest on record for the Little Susitna River, while the harvest of 1,960 chinook salmon was the largest since 1979. Estimated effort decreased 4% under that estimated in 1987 while the estimated harvest increased 21% over that estimated in 1987 (Hepler et.al. 1988).

The estimated total return of chinook salmon to the Little Susitna River during 1988 was 9,492. This is based on an estimated escapement of 7,374

Table 29. Contributions of hatchery-reared smolts[1] to the sport harvest and escapement past the weir in the Little Susitna River, 1988.

Location	Total		Hatchery		
	Harvest	S.E.	Harvest	S.E.	Percent
Fishery					
Burma Road	11,616	392.7	5,916	548.8	50.9
Ship Creek	700	65.9	216	103.8	30.9
M. Landing	443	73.7	336	123.0	75.8
Total	12,759	405.0	6,468	571.9	50.7
Weir	21,438	--[2]	4,764	1,076.3	22.2

[1] All hatchery-reared smolts originated from the 1987 Nancy Lake smolt release.

[2] Measured without error.

chinook salmon above the weir, an estimated sport harvest of 338 chinook salmon above the weir, an estimated sport harvest of 1,622 chinook salmon below the weir, and an estimated 160 chinook salmon spawning below the weir. Based on an estimated sport harvest of 1,960, this represents a minimum inriver exploitation rate by the sport fishery of 21%. It is not possible at this time to estimate total return or exploitation rate as an unknown number of chinook salmon are harvested in the mixed-stock commercial fisheries of upper Cook Inlet.

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APPENDIX

Appendix Table 1. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, C, and D, 1988.

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period A (0800-1159 hours)						
716	3.0	0	0.0	0	0	0
717	3.0	2	12.0	3	3	0
718	3.0	0	0.0	0	0	0
719	3.0	0	0.0	0	0	0
720	3.0	0	0.0	0	0	0
721	3.0	9	48.0	10	10	0
722	3.0	6	28.0	12	12	0
723	3.0	16	69.0	14	14	0
724	3.0	12	58.0	18	18	0
725	3.0	38	150.8	70	70	0
726	3.0	58	197.5	114	146	0
727	3.0	0	0.0	0	0	0
728	3.0	0	0.0	0	0	0
729	3.0	27	92.0	40	40	0
730	3.0	32	133.0	53	67	10
731	3.0	57	257.5	46	46	0
801	3.0	17	67.0	15	18	2
802	3.0	0	0.0	0	0	0
803	3.0	0	0.0	0	0	0
804	3.0	38	141.0	50	54	6
805	3.0	36	144.5	58	65	0
806	3.0	53	209.5	76	81	0
807	3.0	38	195.8	61	61	0
808	3.0	10	36.0	12	12	2
809	3.0	0	0.0	0	0	0
810	3.0	0	0.0	0	0	0
811	3.0	22	75.5	14	16	0
812	3.0	8	19.0	5	5	0
813	3.0	28	71.5	1	1	0
814	3.0	3	6.0	0	0	0
815	3.0	8	18.8	3	3	0
816	3.0	17	49.5	21	30	0
817	3.0	8	9.0	1	2	0
818	3.0	0	0.0	0	0	0
819	3.0	0	0.0	0	0	0
820	3.0	5	16.0	4	4	0
821	3.0	14	25.5	10	10	0

-continued-

Appendix Table 1. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, C, and D, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period A (0800-1429 hours)						
822	3.0	4	10.0	0	1	0
823	3.0	7	16.5	9	9	0
824	3.0	1	3.0	2	2	0
825	3.0	0	0.0	0	0	0
826	3.0	0	0.0	0	0	0
827	3.0	0	0.0	0	0	0
828	3.0	5	20.0	3	3	0
829	3.0	3	12.0	0	0	0
830	3.0	0	0.0	0	0	0
831	3.0	4	16.0	2	2	0
901	3.0	0	0.0	0	0	0
902	3.0	0	0.0	0	0	0
903	3.0	2	6.0	3	3	0
904	3.0	0	0.0	0	0	0
905	3.0	0	0.0	0	0	0
Period B (1200-1559 hours)						
716	3.0	15	74.5	12	12	0
717	3.0	0	0.0	0	0	0
718	3.0	1	6.3	0	0	0
719	3.0	0	0.0	0	0	0
720	3.0	0	0.0	0	0	0
721	3.0	19	52.5	17	17	0
722	3.0	17	63.0	26	26	0
723	3.0	26	100.0	31	31	0
724	3.0	74	281.0	96	118	3
725	3.0	16	62.0	39	39	0
726	3.0	81	381.0	174	235	0
727	3.0	0	0.0	0	0	0
728	3.0	0	0.0	0	0	0
729	3.0	110	449.8	172	205	5
730	3.0	150	690.5	148	171	15
731	3.0	179	934.0	137	144	5
801	3.0	63	295.0	83	84	4
802	3.0	0	0.0	0	0	0

-continued-

Appendix Table 1. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, C, and D, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
803	3.0	0	0.0	0	0	0
804	3.0	75	336.5	59	63	0
805	3.0	76	404.0	105	126	4
806	3.0	59	352.5	78	78	4
807	3.0	92	475.0	97	103	0
808	3.0	95	439.0	79	81	2
809	3.0	0	0.0	0	0	0
810	3.0	0	0.0	0	0	0
811	3.0	33	126.3	20	20	0
812	3.0	35	108.5	34	35	0
813	3.0	80	311.5	42	48	0
814	3.0	73	234.5	38	41	2
815	3.0	27	112.8	33	38	0
816	3.0	17	49.5	11	11	0
817	3.0	19	59.0	5	5	0
818	3.0	0	0.0	0	0	0
819	3.0	0	0.0	0	0	0
820	3.0	24	83.0	35	54	0
821	3.0	46	199.0	53	59	0
Period B (1430-2100 hours)						
822	3.0	20	71.0	23	24	0
823	3.0	32	146.3	29	36	0
824	3.0	11	39.5	13	13	0
825	3.0	0	0.0	0	0	0
826	3.0	0	0.0	0	0	0
827	3.0	45	182.5	49	49	0
828	3.0	8	30.0	5	7	0
829	3.0	0	0.0	0	0	0
830	3.0	0	0.0	0	0	0
831	3.0	4	14.0	1	1	0
901	3.0	0	0.0	0	0	0
902	3.0	0	0.0	0	0	0
903	3.0	9	20.0	0	0	0
904	3.0	5	8.5	4	6	0
905	3.0	6	9.5	2	5	0

-continued-

Appendix Table 1. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, C, and D, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period C (1600-1959 hours)						
716	3.0	18	114.0	12	13	0
717	3.0	63	385.0	13	22	0
718	3.0	9	60.0	2	2	0
719	3.0	0	0.0	0	0	0
720	3.0	0	0.0	0	0	0
721	3.0	12	76.0	0	0	0
722	3.0	44	254.0	28	28	2
723	3.0	40	255.5	50	50	1
724	3.0	83	471.5	71	71	0
725	3.0	66	268.5	167	190	0
726	3.0	64	319.8	125	125	0
727	3.0	0	0.0	0	0	0
728	3.0	0	0.0	0	0	0
729	3.0	95	473.3	139	146	3
730	3.0	143	1,025.0	119	119	0
731	3.0	167	1,103.0	106	107	3
801	3.0	105	637.5	91	99	0
802	3.0	0	0.0	0	0	0
803	3.0	0	0.0	0	0	0
804	3.0	123	626.5	99	99	0
805	3.0	180	838.0	167	184	6
806	3.0	109	622.5	123	125	7
807	3.0	200	977.5	135	178	0
808	3.0	117	508.0	86	95	0
809	3.0	0	0.0	0	0	0
810	3.0	0	0.0	0	0	0
811	3.0	23	123.0	26	28	0
812	3.0	76	380.5	43	43	0
813	3.0	130	620.3	60	62	2
814	3.0	97	554.0	62	71	0
815	3.0	42	245.5	39	53	0
816	3.0	61	236.5	34	36	0
817	3.0	70	288.0	41	50	0
818	3.0	0	0.0	0	0	0
819	3.0	0	0.0	0	0	0
820	3.0	29	103.0	12	12	0
821	3.0	56	190.5	44	58	0

-continued-

Appendix Table 1. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, C, and D, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period D (2000-2400 hours)						
716	3.0	19	96.5	7	7	0
717	3.0	31	149.5	4	4	3
718	3.0	5	17.0	0	0	0
719	3.0	0	0.0	0	0	0
720	3.0	0	0.0	0	0	0
721	3.0	27	121.5	6	6	0
722	3.0	13	32.5	4	4	0
723	3.0	73	356.5	74	85	0
724	3.0	49	242.0	36	36	4
725	3.0	45	189.0	69	80	0
726	3.0	70	357.0	76	80	0
727	3.0	0	0.0	0	0	0
728	3.0	0	0.0	0	0	0
729	3.0	114	443.8	46	46	3
730	3.0	119	720.5	62	62	0
731	3.0	150	725.5	51	51	6
801	3.0	124	477.0	74	75	2
802	3.0	0	0.0	0	0	0
803	3.0	0	0.0	0	0	0
804	3.0	118	476.5	51	53	0
805	3.0	90	452.5	90	105	5
806	3.0	131	653.5	110	122	4
807	3.0	104	488.0	46	46	0
808	3.0	90	385.0	52	54	0
809	3.0	0	0.0	0	0	0
810	3.0	0	0.0	0	0	0
811	3.0	64	247.0	47	56	0
812	3.0	59	298.0	33	33	0
813	3.0	100	502.0	30	35	0
814	3.0	89	529.0	61	62	0
815	3.0	57	245.5	42	57	0
816	3.0	64	355.5	51	54	0
817	3.0	27	114.0	20	21	0
818	3.0	0	0.0	0	0	0
819	3.0	0	0.0	0	0	0
820	3.0	55	309.0	29	40	0
821	3.0	45	185.0	37	49	0

Appendix Table 2. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988.

Date	We/ Wd	SS[1]	Effort (hrs) Mean	Effort (hrs) SE[2]	Harvest Mean	Harvest SE[2]	HPUE[3]	Catch Mean	Catch SE[2]	CPUE[4]
716	We	52	5.5	0.30	0.60	0.114	0.109	0.62	0.114	0.112
717	We	118	5.6	0.30	0.23	0.047	0.041	0.31	0.066	0.055
718	Wd	17	5.4	0.54	0.12	0.081	0.022	0.12	0.081	0.022
721	Wd	67	4.4	0.28	0.49	0.113	0.111	0.49	0.113	0.111
722	Wd	80	4.7	0.26	0.88	0.132	0.185	0.88	0.132	0.185
723	We	155	5.0	0.21	1.09	0.100	0.216	1.16	0.111	0.230
724	We	218	4.8	0.16	1.01	0.087	0.210	1.11	0.103	0.231
725	Wd	165	4.1	0.15	2.09	0.098	0.515	2.30	0.121	0.565
726	Wd	273	4.6	0.15	1.79	0.078	0.390	2.15	0.100	0.467
729	Wd	346	4.2	0.12	1.15	0.067	0.272	1.26	0.082	0.300
730	We	444	5.8	0.15	0.86	0.053	0.149	0.94	0.062	0.163
731	We	553	5.5	0.13	0.61	0.040	0.113	0.63	0.042	0.115
801	Wd	309	4.8	0.14	0.85	0.059	0.178	0.89	0.063	0.187
804	Wd	354	4.5	0.12	0.73	0.056	0.164	0.76	0.061	0.170
805	Wd	382	4.8	0.12	1.10	0.067	0.228	1.26	0.085	0.261
806	We	352	5.2	0.17	1.10	0.064	0.211	1.15	0.071	0.221
807	We	434	4.9	0.13	0.78	0.049	0.159	0.89	0.065	0.182
808	Wd	312	4.4	0.14	0.73	0.059	0.167	0.78	0.066	0.177
811	Wd	142	4.0	0.18	0.75	0.090	0.187	0.85	0.103	0.210
812	Wd	178	4.5	0.19	0.65	0.082	0.143	0.65	0.082	0.144
813	We	338	4.5	0.14	0.39	0.046	0.088	0.43	0.054	0.097
814	We	262	5.1	0.23	0.61	0.061	0.122	0.66	0.064	0.131
815	Wd	134	4.6	0.24	0.87	0.097	0.188	1.13	0.153	0.243
816	Wd	159	4.3	0.31	0.74	0.076	0.169	0.82	0.094	0.190
817	Wd	124	3.8	0.19	0.54	0.080	0.143	0.63	0.096	0.166
820	We	113	4.5	0.22	0.71	0.101	0.157	0.97	0.146	0.215
821	We	161	3.7	0.20	0.89	0.092	0.240	1.09	0.125	0.293
822	Wd	24	3.4	0.20	0.96	0.244	0.284	1.04	0.259	0.309
823	Wd	39	4.2	0.42	0.97	0.154	0.233	1.15	0.186	0.276
824	Wd	12	3.5	0.41	1.25	0.279	0.353	1.25	0.279	0.353
827	We	45	4.1	0.18	1.09	0.152	0.268	1.09	0.152	0.268
828	We	13	3.8	0.50	0.62	0.213	0.160	0.77	0.281	0.200
829	Wd	3	4.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
831	Wd	8	3.8	0.28	0.38	0.183	0.100	0.38	0.183	0.100
903	We	11	2.4	0.15	0.27	0.195	0.115	0.27	0.195	0.115

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Appendix Table 2. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988 (continued).

Date	We/ Wd	SS[1]	Effort (hrs) Mean	Effort (hrs) SE[2]	Harvest Mean	Harvest SE[2]	HPUE[3]	Catch Mean	Catch SE[2]	CPUE[4]
904	We	5	1.7	0.12	0.80	0.374	0.471	1.20	0.374	0.706
905	We	6	1.6	0.20	0.33	0.333	0.211	0.83	0.401	0.526
Totals[5]		6,408	4.8	0.10	0.87	0.042	0.184	0.97	0.047	0.203

1 Sample size (number of anglers interviewed).
2 Standard error.
3 Harvest per unit of effort.
4 Catch per unit of effort.
5 Season totals, means, standard error and rates.

Appendix Table 3. Counts of shore anglers fishing near the Burma Road access site to the Little Susitna River, 1988.

Date	We/ Wd	Period A	B	C	D
716	We	0	4	4	2
717	We	13	17	13	0
718	Wd	2	3	3	1
719	Wd				
720	Wd				
721	Wd	0	3	8	15
722	Wd	5	11	8	15
723	We	10	29	17	7
724	We	18	32	20	17
725	Wd	18	26	11	26
726	Wd	31	31	36	56
727	Wd				
728	Wd				
729	Wd	58	61	60	88
730	We	91	106	114	92
731	We	103	99	99	68
801	Wd	44	39	45	23
802	Wd				
803	Wd				
804	Wd	40	104	66	69
805	Wd	68	93	61	50
806	We	121	101	71	70
807	We	89	129	103	54
808	Wd	45	78	57	72
809	Wd				
810	Wd				
811	Wd	14	21	28	42
812	Wd	23	40	56	42
813	We	54	68	56	24
814	We	26	41	28	7
815	Wd	26	42	24	21
816	Wd	9	26	39	13
817	Wd	10	25	43	23
818	Wd				
819	Wd				
820	We	22	26	21	23
821	We	13	8	12	0

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Appendix Table 3. Counts of shore anglers fishing near the Burma Road access site to the Little Susitna River, 1988 (continued).

Date	We/ Wd	Period A	B	C	D
822	Wd	2	5		
823	Wd	8	10		
824	Wd	11	5		
825	Wd				
826	Wd				
827	We	3	14		
828	We	2	5		
829	Wd	4	2		
830	Wd	0	0		
831	Wd	8	2		
901	Wd				
902	Wd				
903	We	0	3		
904	We	0	0		
905	We/H	0	3		

Appendix Table 4. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by shore anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988.

Date	We/ Wd	SS[1]	Effort (hrs) Mean	Effort (hrs) SE[2]	Harvest Mean	Harvest SE[2]	HPUE[3]	Catch Mean	Catch SE[2]	CPUE[4]
716	We	10	4.6	0.24	0.60	0.267	0.130	0.60	0.267	0.130
717	We	3	10.0	0.00	0.33	0.333	0.033	0.33	0.333	0.033
721	Wd	20	3.6	0.48	0.15	0.150	0.042	0.15	0.150	0.042
722	Wd	22	2.9	0.33	0.05	0.045	0.016	0.05	0.045	0.016
723	We	23	4.8	0.68	0.39	0.163	0.081	0.39	0.163	0.126
724	We	32	4.3	0.36	0.41	0.126	0.094	0.41	0.126	0.094
725	Wd	28	4.3	0.32	0.68	0.193	0.156	0.75	0.203	0.172
726	Wd	45	4.2	0.34	0.69	0.145	0.164	0.69	0.145	0.164
729	Wd	124	4.0	0.17	0.53	0.079	0.135	0.53	0.079	0.135
730	We	112	4.6	0.22	0.44	0.070	0.094	0.44	0.070	0.094
731	We	102	3.4	0.23	0.26	0.061	0.078	0.26	0.061	0.078
801	Wd	57	3.5	0.22	0.44	0.100	0.127	0.46	0.100	0.132
804	Wd	82	4.2	0.30	0.38	0.083	0.090	0.38	0.083	0.090
805	Wd	97	4.6	0.23	0.47	0.089	0.103	0.49	0.097	0.107
806	We	122	4.0	0.19	0.53	0.070	0.132	0.55	0.073	0.136
807	We	103	4.5	0.22	0.65	0.090	0.145	0.65	0.090	0.145
808	Wd	96	3.8	0.18	0.40	0.083	0.105	0.40	0.083	0.105
811	Wd	58	3.6	0.25	0.28	0.095	0.077	0.28	0.095	0.077
812	Wd	58	3.8	0.30	0.19	0.062	0.050	0.19	0.062	0.050
813	We	82	3.1	0.21	0.13	0.045	0.043	0.15	0.046	0.047
814	We	44	2.9	0.28	0.14	0.052	0.047	0.18	0.067	0.063
815	Wd	27	4.9	0.57	1.19	0.227	0.242	1.48	0.347	0.302
816	Wd	72	3.2	0.24	0.71	0.104	0.222	0.83	0.145	0.261
817	Wd	64	3.5	0.27	0.27	0.078	0.075	0.34	0.100	0.097
820	We	39	3.4	0.21	0.26	0.102	0.076	0.26	0.102	0.076
821	We	60	2.7	0.14	0.33	0.097	0.125	0.33	0.097	0.125
822	Wd	8	2.6	0.13	0.50	0.378	0.190	0.63	0.498	0.238
823	Wd	10	5.0	0.58	0.80	0.291	0.158	0.80	0.291	0.158
824	Wd	5	3.4	0.24	1.40	0.400	0.412	1.40	0.400	0.412
827	We	24	4.1	0.32	0.88	0.228	0.211	0.88	0.228	0.211
828	We	5	3.2	0.49	0.20	0.200	0.063	0.20	0.200	0.063
829	Wd	3	4.0	0.00	0.00	0.000	0.000	0.00	0.000	0.000
831	Wd	6	3.5	0.32	0.33	0.211	0.095	0.33	0.211	0.095

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Appendix Table 4. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by shore anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988 (continued).

Date	We/ Wd	SS[1]	Effort (hrs) Mean	Effort (hrs) SE[2]	Harvest Mean	Harvest SE[2]	HPUE[3]	Catch Mean	Catch SE[2]	CPUE[4]
903	We	9	2.2	0.15	0.00	0.000	0.000	0.00	0.000	0.000
904	We	3	1.5	0.00	0.33	0.333	0.222	1.00	0.577	0.667
905	We/H	4	1.9	0.13	0.50	0.500	0.267	1.00	0.577	0.533
Totals[5]		1,659	3.9	0.13	0.43	0.038	0.112	0.45	0.045	0.118

1 Sample size (number of anglers interviewed).
2 Standard error.
3 Harvest per unit of effort.
4 Catch per unit of effort.
5 Season totals, means, standard error and rates.

Appendix Table 5. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Miller's Landing access site during periods A and B, 1988.

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period A (0600-1359 hours)						
730	3.5	0	0.0	0	0	0
731	3.5	2	3.0	0	0	0
801	3.5	0	0.0	0	0	0
802	3.5	0	0.0	0	0	0
803	3.5	4	12.0	0	0	0
804	3.5	2	8.0	0	0	0
805	3.5	0	0.0	0	0	0
806	3.5	0	0.0	0	0	0
807	3.5	2	2.0	0	0	0
808	3.5	0	0.0	0	0	0
809	3.5	0	0.0	0	0	0
810	3.5	0	0.0	0	0	0
811	3.5	5	19.5	3	3	0
812	3.5	9	45.0	10	10	0
813	3.5	4	18.0	2	2	0
814	3.5	0	0.0	0	0	0
815	3.5	0	0.0	0	0	0
816	3.5	0	0.0	0	0	0
817	3.5	3	7.5	3	3	0
818	3.5	0	0.0	0	0	0
819	3.5	2	2.0	0	1	0
820	3.5	0	0.0	0	0	0
821	3.5	12	44.0	7	8	0
822	3.5	0	0.0	0	0	0
823	3.5	0	0.0	0	0	0
824	3.5	0	0.0	0	0	0
825	3.5	0	0.0	0	0	0
826	3.5	0	0.0	0	0	0
827	3.5	2	7.5	0	7	0
828	3.5	2	2.0	0	0	0
829	3.5	0	0.0	0	0	0
830	3.5	0	0.0	0	0	0
831	3.5	0	0.0	0	0	0

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Appendix Table 5. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Miller's Landing access site during periods A and B, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period B (1400-2200 hours)						
730	3.5	11	56.0	0	0	0
731	3.5	17	74.0	2	2	0
801	3.5	0	0.0	0	0	0
802	3.5	0	0.0	0	0	0
803	3.5	10	45.0	0	0	0
804	3.5	10	60.0	0	0	0
805	3.5	15	93.5	2	2	0
806	3.5	13	76.0	1	1	0
807	3.5	19	92.3	4	4	0
808	3.5	0	0.0	0	0	0
809	3.5	0	0.0	0	0	0
810	3.5	19	102.0	3	3	0
811	3.5	1	4.0	0	0	0
812	3.5	11	56.0	16	16	0
813	3.5	20	130.5	11	11	0
814	3.5	17	121.0	21	21	0
815	3.5	0	0.0	0	0	0
816	3.5	0	0.0	0	0	0
817	3.5	7	63.5	13	13	0
818	3.5	6	33.0	6	6	0
819	3.5	10	30.8	6	6	0
820	3.5	7	34.0	7	7	0
821	3.5	9	98.0	6	8	0
822	3.5	0	0.0	0	0	0
823	3.5	4	20.0	3	3	0
824	3.5	4	18.0	0	14	0
825	3.5	0	0.0	0	0	0
826	3.5	0	0.0	0	0	0
827	3.5	0	0.0	0	0	0
828	3.5	8	54.0	16	36	0
829	3.5	0	0.0	0	0	0
830	3.5	0	0.0	0	0	0
831	3.5	3	18.0	5	21	0

Appendix Table 6. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by anglers exiting the sport fishery in the Little Susitna River at the Miller's Landing access site, 1988.

Date	We/ Wd	SS[1]	Effort (hrs) Mean	Effort (hrs) SE[2]	Harvest Mean	Harvest SE[2]	HPUE[3]	Catch Mean	Catch SE[2]	CPUE[4]
730	We	11	5.1	0.46	0.00	0.000	0.000	0.00	0.000	0.000
731	We	19	4.1	0.33	0.11	0.105	0.026	0.11	0.105	0.026
803	Wd	14	4.1	0.45	0.00	0.000	0.000	0.00	0.000	0.000
804	Wd	12	5.7	0.50	0.00	0.000	0.000	0.00	0.000	0.000
805	Wd	15	6.2	0.44	0.13	0.091	0.021	0.13	0.091	0.021
806	We	13	5.8	0.34	0.08	0.077	0.013	0.08	0.077	0.013
807	We	21	4.5	0.61	0.19	0.088	0.042	0.19	0.088	0.042
810	Wd	19	5.4	0.58	0.16	0.115	0.029	0.16	0.115	0.029
811	Wd	6	3.9	0.08	0.50	0.342	0.128	0.50	0.342	0.128
812	Wd	20	5.0	0.32	1.30	0.231	0.257	1.30	0.231	0.257
813	We	24	6.2	0.48	0.54	0.190	0.088	0.54	0.190	0.088
814	We	17	7.1	0.27	1.24	0.315	0.174	1.24	0.315	0.174
817	Wd	10	7.1	1.18	1.60	0.427	0.225	1.60	0.427	0.225
818	Wd	6	5.5	1.50	1.00	0.632	0.182	1.00	0.632	0.182
819	Wd	12	2.7	0.51	0.50	0.261	0.183	0.58	0.260	0.214
820	We	7	4.9	0.30	1.00	0.378	0.206	1.00	0.378	0.206
821	We	21	6.8	0.94	0.62	0.176	0.092	0.76	0.206	0.113
823	Wd	4	5.0	0.00	0.75	0.250	0.150	0.75	0.250	0.150
824	Wd	4	4.5	0.00	0.00	0.000	0.000	3.50	1.443	0.778
827	Wd	2	3.8	2.25	0.00	0.000	0.000	3.50	1.500	0.933
828	We	10	5.6	0.78	1.60	0.400	0.286	3.60	0.909	0.643
831	We	3	6.0	0.00	1.67	0.882	0.278	7.00	1.732	1.167
Totals[5]		270	5.4	0.193	0.54	0.091	0.101	0.77	0.248	0.143

1 Sample size (number of anglers interviewed).
2 Standard error.
3 Harvest per unit of effort.
4 Catch per unit of effort.
5 Season totals, means, standard error, and rates.

Appendix Table 7. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Ship Creek access site during periods A and B, 1988.

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period A (first high tide of the day, 4 hours in length)						
716	4.0	0	0.0	0	0	0
717	4.0	4	56.0	9	9	0
718	4.0	0	0.0	0	0	0
719	4.0	0	0.0	0	0	0
720	4.0	0	0.0	0	0	0
721	4.0	0	0.0	0	0	0
722	4.0	0	0.0	0	0	0
723	4.0	0	0.0	0	0	0
724	4.0	0	0.0	0	0	0
725	4.0	0	0.0	0	0	0
726	4.0	5	40.0	11	11	0
727	4.0	0	0.0	0	0	0
728	4.0	0	0.0	0	0	0
729	4.0	2	6.0	6	9	0
730	4.0	18	112.8	38	39	0
731	4.0	24	147.5	27	27	0
801	4.0	17	182.0	6	6	0
802	4.0	0	0.0	0	0	0
803	4.0	0	0.0	0	0	0
804	4.0	5	50.0	10	10	0
805	4.0	5	50.0	1	1	0
806	4.0	3	6.0	0	0	0
807	4.0	0	0.0	0	0	0
808	4.0	0	0.0	0	0	0
809	4.0	0	0.0	0	0	0
810	4.0	0	0.0	0	0	0
811	4.0	0	0.0	0	0	0
812	4.0	8	160.0	24	24	0
813	4.0	4	12.0	3	3	0
814	4.0	2	13.0	0	0	0
815	4.0	0	0.0	0	0	0
816	4.0	0	0.0	0	0	0
817	4.0	2	16.0	5	5	0
818	4.0	0	0.0	0	0	0
819	4.0	0	0.0	0	0	0
820	4.0	0	0.0	0	0	0
821	4.0	0	0.0	0	0	0

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Appendix Table 7. Daily totals for fishing effort, coho salmon harvest, and coho salmon catch by completed-trip anglers exiting the Little Susitna River at the Ship Creek access site during periods A and B, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period B (second high tide of the day, 4 hours in length)						
716	4.0	11	109.0	5	5	0
717	4.0	2	24.0	0	0	0
718	4.0	0	0.0	0	0	0
719	4.0	0	0.0	0	0	0
720	4.0	0	0.0	0	0	0
721	4.0	3	24.0	2	2	0
722	4.0	0	0.0	0	0	0
723	4.0	20	215.5	48	61	0
724	4.0	17	246.0	43	47	0
725	4.0	7	48.0	17	17	0
726	4.0	9	92.0	25	25	0
727	4.0	0	0.0	0	0	0
728	4.0	0	0.0	0	0	0
729	4.0	22	229.3	62	62	0
730	4.0	51	533.0	58	58	0
731	4.0	2	12.0	2	2	0
801	4.0	3	30.0	0	0	0
802	4.0	0	0.0	0	0	0
803	4.0	0	0.0	0	0	0
804	4.0	4	40.0	10	10	0
805	4.0	10	90.0	15	15	0
806	4.0	4	40.0	12	12	0
807	4.0	11	125.0	18	18	0
808	4.0	10	108.0	29	29	0
809	4.0	0	0.0	0	0	0
810	4.0	0	0.0	0	0	0
811	4.0	0	0.0	0	0	0
812	4.0	0	0.0	0	0	0
813	4.0	18	152.0	24	24	0
814	4.0	4	24.0	4	4	0
815	4.0	0	0.0	0	0	0
816	4.0	6	60.0	20	20	0
817	4.0	0	0.0	0	0	0
818	4.0	0	0.0	0	0	0
819	4.0	0	0.0	0	0	0
820	4.0	0	0.0	0	0	0
821	4.0	2	24.0	6	6	0

Appendix Table 8. Daily summary statistics for fishing effort, coho salmon harvest, and coho salmon catch by anglers exiting the sport fishery in the Little Susitna River at the Ship Creek access site, 1988.

Date	We/ Wd	SS[1]	Effort (hrs) Mean	Effort (hrs) SE[2]	Harvest Mean	Harvest SE[2]	HPUE[3]	Catch Mean	Catch SE[2]	CPUE[4]
716	We	11	9.9	0.51	0.45	0.207	0.046	0.45	0.207	0.046
717	We	6	13.3	0.56	1.50	0.563	0.113	1.50	0.563	0.133
721	Wd	3	8.0	0.00	0.67	0.333	0.083	0.67	0.333	0.083
723	We	20	10.8	1.62	2.40	0.245	0.223	3.05	0.473	0.283
724	We	17	14.5	1.67	2.53	0.244	0.175	2.76	0.291	0.191
725	Wd	7	6.9	0.91	2.43	0.297	0.354	2.43	0.297	0.354
726	Wd	14	9.4	0.33	2.57	0.137	0.273	2.57	0.137	0.273
729	Wd	24	9.8	1.24	2.83	0.359	0.289	2.96	0.373	0.302
730	We	69	9.4	0.59	1.39	0.134	0.149	1.41	0.136	0.150
731	We	26	6.1	0.88	1.12	0.224	0.182	1.12	0.224	0.182
801	Wd	20	10.6	1.02	0.30	0.105	0.028	0.30	0.105	0.028
804	Wd	9	10.0	0.47	2.22	0.324	0.222	2.22	0.324	0.222
805	Wd	15	9.3	1.09	1.07	0.300	0.114	1.07	0.300	0.114
806	We	7	6.6	2.03	1.71	0.606	0.261	1.71	0.606	0.261
807	We	11	11.4	0.53	1.64	0.338	0.144	1.64	0.338	0.144
808	Wd	10	10.8	0.33	2.90	0.100	0.269	2.90	0.100	0.269
812	Wd	8	20.0	0.76	3.00	0.000	0.150	3.00	0.000	0.150
813	We	22	7.5	1.09	1.23	0.185	0.165	1.23	0.185	0.165
814	We	6	6.2	0.17	0.67	0.333	0.108	0.67	0.333	0.108
816	Wd	6	10.0	0.73	3.33	0.422	0.333	3.33	0.422	0.333
817	Wd	2	8.0	0.00	2.50	0.500	0.313	2.50	0.500	0.313
821	We	2	12.0	0.00	3.00	0.000	0.250	3.00	0.000	0.250
Totals[5]		315	9.8	0.45	1.71	0.138	0.176	1.78	0.144	0.182

1 Sample size (number of anglers interviewed).
2 Standard error.
3 Harvest per unit of effort.
4 Catch per unit of effort.
5 Season totals, means, standard error, and rates.

Appendix Table 9. Daily totals for fishing effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, and C, 1988.

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period A (0400-1159 hours)						
604	2.5	35	119.5	2	2	0
605	2.5	29	109.3	2	2	0
606	2.5	4	7.8	0	0	0
607	2.5	0	0.0	0	0	0
608	2.5	0	0.0	0	0	0
609	2.5	13	61.0	3	3	0
610	2.5	30	78.8	7	7	0
611	2.5	9	30.5	1	1	0
612	2.5	51	246.0	17	17	0
613	2.5	25	68.5	4	4	0
614	2.5	0	0.0	0	0	0
615	2.5	4	13.0	0	0	0
616	2.5	0	0.0	0	0	0
617	2.5	0	0.0	0	0	0
618	2.5	30	109.0	1	1	0
619	2.5	68	304.8	20	45	0
620	2.5	28	84.5	5	10	0
621	2.5	9	26.5	6	6	0
622	2.5	3	8.0	0	0	0
623	2.5	0	0.0	0	0	0
624	2.5	0	0.0	0	0	0
625	2.5	18	50.0	2	2	0
626	2.5	14	40.5	3	3	0
627	2.5	14	38.8	4	6	0
628	2.5	0	0.0	0	0	0
629	2.5	4	9.5	0	2	0
630	2.5	0	0.0	0	0	0
701	2.5	0	0.0	0	0	0
702	2.5	1	2.0	0	0	0
703	2.5	13	36.0	3	4	0
704	2.5	2	4.0	0	0	0
705	2.5	0	0.0	0	0	0
706	2.5	0	0.0	0	0	0

-continued-

Appendix Table 9. Daily totals for fishing effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, and C, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period B (1200-1759 hours)						
604	2.5	105	453.3	8	8	4
605	2.5	161	845.3	18	18	10
606	2.5	60	285.5	13	14	0
607	2.5	0	0.0	0	0	0
608	2.5	0	0.0	0	0	0
609	2.5	79	350.5	28	43	3
610	2.5	85	379.8	27	34	0
611	2.5	99	417.5	18	18	0
612	2.5	118	541.0	24	42	3
613	2.5	67	273.8	29	32	0
614	2.5	17	57.8	1	11	0
615	2.5	93	543.0	27	29	0
616	2.5	0	0.0	0	0	0
617	2.5	0	0.0	0	0	0
618	2.5	112	487.3	4	4	5
619	2.5	71	302.5	9	12	5
620	2.5	91	389.0	17	26	1
621	2.5	34	130.5	8	14	0
622	2.5	80	348.0	13	26	0
623	2.5	0	0.0	0	0	0
624	2.5	0	0.0	0	0	0
625	2.5	25	85.0	3	11	1
626	2.5	89	304.0	26	46	0
627	2.5	20	90.5	6	33	0
628	2.5	0	0.0	0	0	0
629	2.5	37	111.5	6	8	0
630	2.5	0	0.0	0	0	0
701	2.5	0	0.0	0	0	0
702	2.5	46	231.3	9	25	0
703	2.5	37	91.0	5	7	0
704	2.5	52	158.0	3	5	0
705	2.5	16	99.5	1	1	0
706	2.5	0	0.0	0	0	0

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Appendix Table 9. Daily totals for fishing effort, chinook salmon harvest, and chinook salmon catch by completed-trip anglers exiting the Little Susitna River at the Burma Road access site during periods A, B, and C, 1988 (continued).

Date	Hours Censused	Number of Interviews	Angler Hours	Coho Salmon Harvest	Coho Salmon Catch	Missed Anglers
Period C (1600-2400 hours)						
716	3.0	18	114.0	12	13	0
604	2.5	81	381.0	2	2	4
605	2.5	54	177.3	3	3	0
606	2.5	45	164.0	8	8	0
607	2.5	0	0.0	0	0	0
608	2.5	0	0.0	0	0	0
609	2.5	36	111.5	3	3	7
610	2.5	32	170.5	10	10	2
611	2.5	100	603.0	24	25	6
612	2.5	63	296.0	11	12	0
613	2.5	66	366.0	24	37	0
614	2.5	63	342.5	16	33	4
615	2.5	64	326.8	13	27	2
616	2.5	0	0.0	0	0	0
617	2.5	0	0.0	0	0	0
618	2.5	53	232.5	6	7	0
619	2.5	92	419.5	16	28	0
620	2.5	92	0.0	0	0	0
621	2.5	38	131.8	2	2	0
622	2.5	58	178.5	9	12	0
623	2.5	0	0.0	0	0	0
624	2.5	0	0.0	0	0	0
625	2.5	61	274.3	12	12	0
626	2.5	76	293.5	11	13	2
627	2.5	14	66.5	3	7	0
628	2.5	0	0.0	0	0	0
629	2.5	44	150.5	7	26	0
630	2.5	0	0.0	0	0	0
701	2.5	0	0.0	0	0	0
702	2.5	32	122.8	2	2	0
703	2.5	38	102.0	1	5	0
704	2.5	14	23.3	2	2	0
705	2.5	18	82.5	5	5	0
706	2.5	11	34.0	2	3	0

Appendix Table 10. Daily summary statistics for fishing effort, chinook salmon harvest, and chinook salmon catch by anglers exiting the sport fishery in the Little Susitna River at the Burma Road access site, 1988.

Date	We/ Wd	SS[1]	Effort (hrs) Mean	Effort (hrs) SE[2]	Harvest Mean	Harvest SE[2]	HPUE[3]	Catch Mean	Catch SE[2]	CPUE[4]
604	We	220	4.3	0.17	0.05	0.015	0.013	0.05	0.015	0.013
605	We	244	4.6	0.18	0.09	0.019	0.020	0.09	0.019	0.020
606	Wd	109	4.2	0.24	0.19	0.038	0.046	0.20	0.041	0.048
609	Wd	128	4.1	0.22	0.27	0.039	0.065	0.38	0.067	0.094
610	Wd	147	4.3	0.25	0.30	0.039	0.070	0.35	0.053	0.081
611	We	208	5.1	0.23	0.21	0.031	0.041	0.21	0.032	0.042
612	We	232	4.7	0.19	0.22	0.029	0.048	0.31	0.055	0.066
613	Wd	158	4.5	0.28	0.36	0.038	0.080	0.46	0.058	0.103
614	Wd	80	5.0	0.41	0.21	0.046	0.042	0.55	0.177	0.110
615	Wd	161	5.5	0.29	0.25	0.034	0.045	0.35	0.057	0.063
618	We	195	4.3	0.18	0.06	0.017	0.013	0.06	0.017	0.014
619	We	231	4.4	0.20	0.19	0.026	0.044	0.37	0.069	0.083
620	Wd	119	4.0	0.33	0.18	0.036	0.046	0.30	0.063	0.076
621	Wd	81	3.6	0.24	0.20	0.045	0.055	0.27	0.066	0.076
622	Wd	141	3.8	0.21	0.16	0.031	0.041	0.27	0.066	0.071
625	We	104	3.9	0.26	0.16	0.036	0.042	0.24	0.075	0.061
626	We	179	3.6	0.17	0.22	0.032	0.063	0.35	0.057	0.097
627	Wd	48	4.1	0.37	0.27	0.065	0.066	0.96	0.369	0.235
629	Wd	85	3.2	0.23	0.15	0.039	0.048	0.42	0.128	0.133
702	We	79	4.5	0.38	0.14	0.039	0.031	0.34	0.092	0.076
703	We	88	2.6	0.14	0.10	0.032	0.039	0.18	0.052	0.070
704	We	68	2.7	0.20	0.07	0.032	0.027	0.10	0.037	0.038
705	Wd	34	5.4	0.86	0.18	0.066	0.033	0.18	0.066	0.033
706	Wd	11	3.1	0.42	0.18	0.122	0.059	0.27	0.195	0.088
Totals[5]		3,151	4.3	0.10	0.18	0.098	0.043	0.28	0.028	0.064

1 Sample size (number of anglers interviewed).
2 Standard error.
3 Harvest per unit of effort.
4 Catch per unit of effort.
5 Season totals, means, standard error and rates.

Appendix Table 11. Daily and cumulative counts of salmon, by species, at the weir on the Little Susitna River, 1988.

Species:	Chinook		Sockeye		Chum		Coho		Pink	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
602	9	9	9	9						
603	5	14	25	34						
604	38	52	113	147						
605	99	151	157	304	1	1				
606	17	168	14	318	0	1				
607	24	192	8	326	0	1				
608	39	231	55	381	0	1				
609	555	786	87	468	0	1				
610	1,359	2,145	130	598	0	1				
611	277	2,422	112	710	0	1				
612	656	3,078	108	818	0	1				
613	172	3,250	61	879	0	1				
614	91	3,341	44	923	0	1				
615	298	3,639	30	953	0	1				
616	34	3,673	35	988	0	1				
617	195	3,868	18	1,006	0	1				
618	612	4,480	38	1,044	0	1				
619	587	5,067	8	1,052	0	1				
620	34	5,101	31	1,083	0	1				
621	152	5,253	41	1,124	0	1				
622	31	5,284	15	1,139	0	1				
623	64	5,348	15	1,154	0	1				
624	234	5,582	10	1,164	0	1				
625	207	5,789	6	1,170	0	1				
626	174	5,963	8	1,178	0	1				
627	318	6,281	4	1,182	0	1				
628	131	6,412	3	1,185	0	1				
629	41	6,453	2	1,187	0	1				
630	88	6,541	0	1,187	0	1				
701	61	6,602	0	1,187	0	1				
702	180	6,782	0	1,187	0	1				
703	145	6,927	2	1,189	0	1				
704	42	6,969	2	1,191	0	1				
705	141	7,110	1	1,192	0	1				
706	14	7,124	0	1,192	0	1				
707	5	7,129	1	1,193	0	1				
708	5	7,134	0	1,193	0	1				
709	58	7,192	0	1,193	1	2				
710	202	7,394	6	1,199	19	20				
711	51	7,445	7	1,206	18	38				

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Appendix Table 11. Daily and cumulative counts of salmon, by species, at the weir on the Little Susitna River, 1988 (continued).

Species:	Chinook		Sockeye		Chum		Coho		Pink	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
712	4	7,449	1	1,207	9	47				
713	5	7,454	0	1,207	0	47	0	1		
714	5	7,459	0	1,207	12	59	0	1		
715	7	7,466	0	1,207	10	69	0	1		
716	22	7,488	7	1,214	100	169	5	6	1	1
717	49	7,537	125	1,339	123	292	0	6	0	1
718	10	7,547	29	1,368	89	381	1	7	2	3
719	8	7,555	52	1,420	84	465	11	18	0	3
720	4	7,559	72	1,492	171	636	6	24	4	7
721	25	7,584	15	1,507	161	797	9	33	1	8
722	13	7,597	20	1,527	667	1,464	90	123	62	70
723	18	7,615	22	1,549	1,007	2,471	84	207	103	173
724	0	7,615	137	1,686	807	3,278	12	219	82	255
725	0	7,615	69	1,755	1,648	4,926	2	221	103	358
726	22	7,637	110	1,865	2,743	7,669	704	925	317	675
727	9	7,646	111	1,976	1,845	9,514	338	1,263	559	1,234
728	26	7,672	76	2,052	1,723	11,237	128	1,391	887	2,121
729	3	7,675	58	2,110	1,251	12,488	135	1,526	861	2,982
730	2	7,677	26	2,136	2,254	14,742	84	1,610	456	3,438
731	2	7,679	82	2,218	1,237	15,979	163	1,773	2,691	6,129
801	5	7,684	124	2,342	729	16,708	60	1,833	553	6,682
802	3	7,687	48	2,390	301	17,009	128	1,961	185	6,867
803	0	7,687	48	2,438	542	17,551	86	2,047	106	6,973
804	3	7,690	55	2,493	787	18,338	344	2,391	672	7,645
805	5	7,695	19	2,512	700	19,038	406	2,797	633	8,278
806	4	7,699	38	2,550	844	19,882	1,161	3,958	1,056	9,334
807	5	7,704	49	2,599	891	20,773	1,429	5,387	1,888	11,222
808	2	7,706	8	2,607	543	21,316	298	5,685	748	11,970
809	2	7,708	11	2,618	553	21,869	366	6,051	547	12,517
810	1	7,709	0	2,618	510	22,379	573	6,624	777	13,294
811	0	7,709	4	2,622	227	22,606	589	7,213	440	13,734
812	0	7,709	3	2,625	295	22,901	2,198	9,411	905	14,639
813	0	7,709	5	2,630	151	23,052	1,849	11,260	306	14,945
814	0	7,709	2	2,632	88	23,140	1,301	12,561	295	15,240
815	1	7,710	4	2,636	84	23,224	1,520	14,081	140	15,380
816	1	7,711	1	2,637	55	23,279	433	14,514	71	15,451
817	0	7,711	0	2,637	33	23,312	470	14,984	61	15,512
818	0	7,711	0	2,637	40	23,352	47	15,031	19	15,531
819	0	7,711	0	2,637	18	23,370	31	15,062	7	15,538

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Appendix Table 11. Daily and cumulative counts of salmon, by species, at the weir on the Little Susitna River, 1988 (continued).

Species:	Chinook		Sockeye		Chum		Coho		Pink	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
820	0	7,711	0	2,637	59	23,429	76	15,138	35	15,573
821	0	7,711	0	2,637	35	23,464	126	15,264	8	15,581
822	0	7,711	2	2,639	39	23,503	223	15,487	11	15,592
823	0	7,711	1	2,640	34	23,537	607	16,094	7	15,599
824	0	7,711	0	2,640	25	23,562	592	16,686	4	15,603
825	0	7,711	0	2,640	8	23,570	41	16,727	5	15,608
826	0	7,711	0	2,640	22	23,592	523	17,250	11	15,619
827	0	7,711	0	2,640	10	23,602	748	17,998	4	15,623
828	0	7,711	0	2,640	10	23,612	1,173	19,171	8	15,631
829	0	7,711	0	2,640	9	23,621	840	20,011	4	15,635
830	0	7,711	0	2,640	5	23,626	411	20,422	2	15,637
831	0	7,711	0	2,640	6	23,632	245	20,667	2	15,639
901	0	7,711	0	2,640	3	23,635	69	20,736	2	15,641
902	0	7,711	0	2,640	5	23,640	23	20,759	0	15,641
903	0	7,711	0	2,640	4	23,644	35	20,794	0	15,641
904	0	7,711	0	2,640	1	23,645	49	20,843	0	15,641
905	0	7,711	0	2,640	16	23,661	398	21,241	2	15,643
906	1	7,712	2	2,642	7	23,668	62	21,303	0	15,643
907	0	7,712	0	2,642	2	23,670	76	21,379	1	15,644
908	0	7,712	0	2,642	3	23,673	20	21,399	0	15,644
909	0	7,712	0	2,642	3	23,676	8	21,407	0	15,644
910	0	7,712	0	2,642	0	23,676	22	21,429	0	15,644
911	0	7,712	0	2,642	1	23,677	3	21,432	0	15,644
912	0	7,712	0	2,642	0	23,677	6	21,438	0	15,644
Total		7,712		2,642		23,677		21,438		15,644

Appendix Table 12. Escapement counts of coho salmon for selected index areas in Matanuska-Susitna Valley streams, 1983-1988.

Stream	Year					
	1988	1987	1986	1985	1984	1983
Little Susitna River	20,491[4]	4,865	1,038[1]	3,540	20,991	2,666
Spring (Wasilla) Creek	82	110	141	150	NS[2]	NS
Yellow Creek	110	58	20	65	0	NS
McRoberts Creek	1,911	667	439	662	NS	NS
Spring (Flats) Creek	30	42	147	81	90	28
Cottonwood Creek	293	360	121	334	935	766
Wasilla Creek	NS	251	NS	248	628	41
Rabideux Creek	230	50[3]	NS	82	480	NS
Birch Creek	63	46	25	30	236	NS
Question Creek	337	149	NS	89	60	NS
Answer Creek	160	10	NS	9	57	NS
Total	23,707	6,608	1,931	5,290	23,477	3,464

1 Incomplete survey.
2 Not surveyed.
3 Poor survey conditions.
4 Weir count minus estimated harvest above weir.